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STAT

Austria

Austria -- Landscape, Economy, and Population

~~Location, Boundaries, Size~~ --

Josef Stolitzka, Leo Helmer, Anna Janda

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AUSTRIA -- LANDSCAPE, ECONOMY, AND POPULATION

Oesterreich -- Landschaft, Wirtschaft, Bevoelkerung [Austria -- Landscape, Economy, and Population], 1953, Vienna, Pages 1-202

Josef Stolitzka
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STAT

AUSTRIA -- LANDSCAPE, ECONOMY, AND POPULATION

LOCATION, BOUNDARIES, SIZE

Austria is located in Central Europe between $46^{\circ}22'$ N latitude and $49^{\circ}1'$ N latitude and between $9^{\circ}32'$ E longitude and $17^{\circ}10'$ E longitude.

The southernmost settlement is Bad [Spa] Vellach (south of Eisenkappel, Carinthia); the northernmost settlement is Rottal (north of Litschau, Lower Austria); the westernmost is Bangs (west of Feldkirch, Vorarlberg); the easternmost is Deutsch Jahrndorf, northern Burgenland. Austria's greatest width (270 km) runs along 15° E longitude, its smallest (60 km) along 12° E longitude; its greatest length (580 km) runs along 47° N latitude, its shortest (230 km) along $48^{\circ}30'$ N latitude; along 48° N latitude it amounts to about 300 km. Because of its location Austria is on Central European Time.

Austria is Europe's third-largest inland country (Czechoslovak Republic, Hungary, Austria, Switzerland) and borders on two major countries (German Federal Republic, Italy), four medium-sized countries (Czechoslovak Republic, Hungary, Yugoslavia, Switzerland), and one small country (Liechtenstein). Its borders are 2,637 km long.

Of this figure Austria's common border with the German Federal Republic amounts to 784 km, with the Czechoslovak Republic to 548 km, with Hungary to 366 km, with Yugoslavia to 311 km, with Italy to 430 km, with Switzerland to 162 km, and with Liechtenstein to 36 km. Of the state capitals only Vienna and Graz are more than 40 km from the nearest international boundary.

Austria's area amounts to approximately 84,000 sq km (83,850).

Austria is closest in size to Hungary; Switzerland is not even half

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as large as Austria, while the German Federal Republic is not quite three times, the Czechoslovak Republic one and a half times, Yugoslavia three times, and Italy three and a half times as large as Austria.

SECTION I. THE LANDSCAPE

The Major Landscapes

We find the following major landscapes represented in Austria: the mountains of the East Alps; the flatlands and hill country of the foreland along the eastern fringes of the Alps, the Alpine Foreland and the Carpathian Foreland, as well as serrated residual plateaus of the Muehlviertel and Waldviertel areas belonging to the Bohemian Massif and consequently to the German Uplands.

A. The East Alps

1. Structure, Origin, Variety of Types

Roughly two-thirds of Austria's area is covered by the East Alps. The series of valleys which runs from W to E divides the mountains into three long zones: the North Alps, the Central Alps, and the South Alps.

Let us assume the line Klostertal -- Arlberg Pass -- Inn River Valley -- Lake Zell -- Wagreiner Heights -- Enns River Valley -- Schober Pass -- Mur Valley and Muerz Valley -- Mt. Semmering -- Vienna Bay to be the dividing line between the North and Central Alps, though there may be variations in rock formations here and there. Austria's South Alps are sharply divided from the Central Alps by the broad trough of the Puster Valley and the Drau River Valley.

The manifold landscapes are brought about by the variations in the rock formations of these zones. Each zone gets its name from the type of rock which constitutes its main part, though it may not necessarily be the exclusively predominant type. We therefore speak of a

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crystalline zone, of graywacke zones, of limestone zones, and of a sandstone zone (see pertinent map in atlas).

In the crystalline zone the granite types (granite, tonalite, diorite)cover the smallest part; gneiss types are more frequent, as are the crystalline slate types (granite gneiss, slate gneiss, mica schist, tonalite, or phyllite). They originated mainly in the Paleozoic. Crystalline rock and slate often form knolls and broad ridges; cliffs and aretes are found only above the snow line and in the cirques; the weathering soil is particularly strongly represented in the slate area (wood and pasture soil, rock stream formation); these are also ore-rich.

The limestone types of the Alps partly originated in the Paleozoic (Silurian and Devonian); most of them however date back to the Mesozoic -- the Triassic, to be specific; some can be traced back to the Jurassic; the most recent types date back to the Cretaceous and the Tertiary which belongs to the Cainozoic (Table 12).

Below the Triassic limestones we find mostly slate rocks which originated in the deposits located far from the coasts of the Triassic sea. They are called Werfen slate for the village of Werfen in the Salzach River Valley. Due to their impermeability they are a valuable spring horizon (sources of the Vienna High Mountain Spring Water System); they are of economic significance due to their salt and gypsum deposits and their soil which is good for farming. Of the limestones of the Triassic, the Gutenstein limestone (Gutenstein, Lower Austria), the Wetterstein limestone in North Tirol, and the Hallstatt limestone are the most frequent. The most massive bodies and the highest ranges of the Limestone Alps consist mostly of the light Dachstein limestone (reef limestones of the sea) and the Main Dolomite, a transformation product of limestone.

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The limestone of the Jurassic is less frequent and appears mostly in the form of islands in Triassic rock. Adnet limestone (Adnet, E of Hallein) is an important building stone.

The Triassic limestones form walls and sharp, heavily serrated aretes.

The sandstones originated during all geologic ages either as sedimentary rocks or as continental deposits. Sandstones appear in conjunction with other, often foliated rocks from the Paleozoic in a special form along the northern and southern edges of the crystalline area. The two rock zones along the interior sides of the Limestone Alps received their name when these old sandstones were called graywacke, a mining term. The counterpart of the northern graywacke zone is formed mainly by the range of the Carnic Alps.

The alps also contain sandstones and marl which here and there appear embedded in Triassic limestone. Since they are found near Gosau on the N side of Mt. Dachstein, they are called Gosau layers and they are therefore considered to be neritic deposits; they originated in the Cretaceous period.

The sandstones of the sandstone zone proper, which in Austria lies in front of the limestone zone, partly originated in the Cretaceous period, partly in the oldest Tertiary (Eocene). These sandstones and marls are commonly called flysch; this name comes from Switzerland and is related to the word "to flow"; it indicates that slippages are easily possible in the flysch zone.

Sandstones are very susceptible to erosion. In combination with other rocks they often form depth lines. Where they form mountains by themselves, they reveal knolls and rounded ridges with slopes.

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The development of the Alps can be traced back not only to the folding of the sedimentary layers but also to major overfaults of entire layer accumulations, so-called "overfault covers," which are mostly separated from their area of origin, the "roots" of the covers (Figure 1). At times we can find layers next to and on top of each other though they may come from different areas of origin.

During these movements there often took place a certain transformation (metamorphosis) of the rocks. The resistance against the effect of the air cover (weather, water, ice) depended mostly on the degree of hardness of the rock. The actual development of the mountain forms took place under the constant influence of the air cover. The surface created in this manner during a certain period of time was again broken up, folded, and moved in another "mountain formation phase" as a result of the earth crust movements, upthrusts, and downthrusts. Now the remnants of the old surface can be found only in the gaps of the overfault layers in the form of "windows" or they ended up in a higher or lower position as a result of upthrusts or downthrusts of the blocks. Small leftovers of an other wise eroded cover may remain standing in the form of chimneys.

It is difficult to reconstruct uniform covers. Nevertheless certain parts of the Austrial Alps, such as the main body of the central zone, the slate zone, the limestone zone, etc were considered to be such covers and were called "East Alpine covers." They are overfaulted from the S on the West Alps which are considered to be parts of a so-called "Helvetian cover" and a "Pennine cover." This "thrust cover theory" has so far not been replaced by a generally satisfactory explanation.

The major longitudinal valleys of the Alps seem to have developed from original depth lines, synclines of folding or downthrusts, fault lines,

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and troughs. They can thus be said to have a tectonic origin. Many valleys follow the cover edges, e. g., the Rhine Valley, the Wipp Valley, the line Katschberg -- Lieser Valley, etc.

It must be remembered that the current picture of the mountains did not develop all at once but in several orogenic phases and in slow, successive movements which still have not come to a stop.

It is assumed that the shape of the current forms of the Alps can be traced back partly to a major crust movement (upthrusts and downthrusts) during the Tertiary and partly to the effect of the ice age.

At the end of the Old Tertiary the Central Alps and the graywacke zone were an uplands landscape with flat knolls and wide valleys and subtropical vegetation. The rivers carried huge masses of gravel northward and thus covered a large part of the North Alps during the Lower Miocene. In combination with a backward downthrust, the North Alps had been degraded to hill country at the time of the transition from the Miocene to the Pliocene. The major longitudinal valleys, such as that of the Enns River, were at that time not to be found in this hill country. The once continuous Young Tertiary hill landscape is best preserved in the plateau mountains of the eastern Limestone Alps and especially on Mt. Rax. For this reason this hill landscape is also called "Rax landscape." Reassorted remnants of the old gravel cover are today found in the form of small quartz pebbles (chalcedony) on the surfaces of the "Rax landscape"; they are however also found on lower situated and therefore younger surfaces, as well as in crevices, chasms, and dolinas. Attempts were also made to find old land surfaces in the Central Alps.

The main phase of the collapse of the link between the Alps and Carpathians occurred at the beginning of the Middle Miocene at which time

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an uplift and breakup of the eastern fringe took place. The body of the East Alps and parts in the interior were at times washed by the sea. The ensuing young uplifts and doming of the East Alps and their breakup into heaved and downthrown blocks resulting from uneven vertical crust movements (breaks) are most probably connected with the development of peripheral depressions along the northern and especially the eastern and southern fringes of the Alps. As a result of this we find the general present-day arrangement of the mountains and downthrust areas which developed during the topmost Miocene and the Pliocene. The movements however lasted well into the Quaternary. Erosion has been cutting away at this landscape for the past 12 to 13 million years so that the present relief must have been considerably higher at one time. Earthquake areas and lines represent the last reminders of the great earth crust movements whose continuation could be established in various places in the Alps (cf. E. Spengler and A. Winkler-Hermaden).

The wide variety of ice age forms includes roundishly knoblike heights, cirques, trough valleys with valley steps, waterfalls, and gorges, as well as lakes and moraine landscapes.

The manner and frequency of the effects of the ice age are to be based on the fact that the ice age was not a climatically uniform and even period but that it was interrupted by warmer interim ice periods, the interglacial periods. For this reason we distinguish several ice age phases during which the elevation of the snow line and the length of glaciers varied.

Glacial research, the study of the ice age and its effects, has led to the assumption of four or three ice ages in the Alps. The duration of the ice age has been estimated at 600,000 years and more.

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At the time of maximum glaciation the snow line was situated at an elevation of between 1,100 and 1,800 m.

Certain definite phases were also established in the recession of the glaciers during the postglacial period, i.e., the period which followed the ice age. These phases constitute the transition of the present state of glaciation.

After the recession of glaciation certain results of the work of the glaciers remained behind; these are very decisive to the landscape picture of the Alps.

The cirques, the source areas of glaciers, are niches in the slopes; they have a relatively level floor and are enclosed by steep back and side walls. The forms of the cirques, which are almost omnipresent in the high mountains, are extremely varied. The position of the cirques along the slopes of a mountain range very often affects the shape of the peaks. As a result of the cirques which push in from several sides, the peaks often assume knife-edge or pyramidal shapes. For this reason the peaks of high mountains are subdivided into matterhorns and rounded bosses. The floors of the cirques were scooped out by the glaciers and the rubble falling from the side walls was carried away. In this manner more or less deep basins were formed between the polished knobs; in these basins we often find high mountain lakes, the so-called cirque lakes. They are blocked by rock barriers and moraines. In the limestone area the cirque basins were often transformed into dolinas.

The traces of ice age glaciers are also revealed in the forms of the valleys. However these forms even in the high mountains were not uniformly created by ice age glaciers. They were frequently transformed into trough valleys. A trough valley usually has convexly domed upper edges,

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the so-called trough shoulders; it has a cirquelike valley end, the trough cirque, as well as valley steps with rock barriers which close off the higher situated valley floor against the down-valley sections; not infrequently it has waterfalls or gorges.

The might of the ice age glaciers -- the ice stream of the Inn Valley glacier for instance was 1,700 m high -- caused the ice masses to spill outward over lower situated saddles of the fringe zone which they scooped out further. In this manner many an Alpine pass was formed.

The moraine rubble of the ice age glacier remained as fringe step of the valleys in which role it often literally formed an uplands area. The moraines form hill landscapes also in the former tongue area of the glacier which after all was located at different elevations during the various ice age phases. The tongue of the Drau glacier was 36 km wide near Klagenfurt; the Salzach glacier, which originally extended into the Alpine foothills, later terminated near Bischofshofen. Many of today's Alpine lakes (dammed-up lakes) were formed in the area of scooping and moraine deposit.

The various recession phases of the glaciers can still be recognized by the location of the moraines (recessional moraines). In the interglacial periods the partial melting of the glaciers caused strong erosion of the valleys and a filling of the Alpine foothills with the mud and gravel of the glacier streams.

In the succession of filling and erosion stages the Alpine rivers left their former valley floors behind in the form of terraces of varying age. In many places in the valleys of the mountains and particularly in the Alpine Foreland these terraces give the landscape its characteristic look.

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Pollen analysis indicated a postglacial warm period during which the snow line was about 300 to 400 m higher than today. For this reason the few glaciers of the northern Limestone Alps, in contrast to several glaciers of the Central Alps, do not represent remnants of the ice age; they were newly formed after the postglacial warm period. Several glacier high marks can be traced back to historic times; the last dates back to 1850. Since that time the glaciers, with a few interruptions, have been melting rather strongly. The Alpine glaciers have been studied scientifically for several decades.

Today the snow line lies generally at 2,500 to 2,900 m.

2. The North Alps

The North Alps in general include the flysch zone and the Limestone Alps.

a. The Flysch Zone constitutes a comparatively narrow exterior fringe of the Alps; it extends from Vienna to the Salzach River cross valley and gets somewhat wider in Vorarlberg. In general the zones consists of 400 to 900 m high ridges and knolls which, with the exception of the Vienna Woods in the E and the Bregenz Forest in the W, do not form connected groups and therefore do not have any special names. The heights which consist of quartz and limestone, marl and conglomerates are covered chiefly with beech forests in the E. In the central section the fields and meadows, bordered by scrubs ("Hag"), extend far up the slopes. The flysch mountains in Vorarlberg, between which we find a chain of Jurassic limestone mountains, in places rise to an elevation of 2,000 m and therefore reveal entirely different forms such as razorbacks and even low aretes between which cirques are located. The Bregenz Forest no longer deserves that name since pastures and meadows predominate there today.

b. The Limestone Alps. Here we distinguish the Low Limestone Alps and the High Limestone Alps. The difference lies in the varying

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elevations and rock structure.

(1) The Low Limestone Alps Zone is wider than the flysch zone with which it merges without a definite break. In the E it forms knolls and razorbacks W of the Enns which consist mostly of dolomite. In the Low Limestone Alps of Lower Austria, which are 800 to 1,500 m high, rock pinnacles and rock walls reach skyward above the slopes which are thickly covered with conifers. Wide and narrow sections followin rapid succession in the heavily broken up network of valleys; the wider sections were important in the rise of settlements.

W of the Enns River and up to the Salzach River the Low Limestone Alps are interfingered with the High Limestone Alps so that they cannot be grouped into separate units. Rocks of varying hardness and their location influence the peculiar forms of the mountains of the Salzkammergut area, e.g., Mt. Schafberg.

W of the Salzach the major part of the Low Limestone Alps lies on German territory.

(2) The High Limestone Alps in their eastern part form bosses the most important of which are Mt. Schneeberg (2,075 m) (elevation figures taken from the 1:500,000 Map of the Republic Austria, published by the Federal Bureau of Standards and Surveying (land survey), Vienna last revised in October 1952), Mt. Rax (2,007 m), Mt. Schneealpe (1,904 m), Mt. Hohe Veitsch (1,982 m), and Mt. Hochschwab (2,277 m). They bear extensive plateaus with flat knolls while all around rock walls, dented by cirques higher up, drop down into narrow and deep canyons. The flat areas however are not always situated at the same elevation; the higher situated ones, between 1,800 and 2,200 m, bear alpine pastures; the lowest ones extend down into the forest zone. Karst deadened valleys with many steps and blunt ends often penetrate deep into the bosses.

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The northeastern spurs of Mt. Hochschwab belong to the mountain groups which surround the Mariazell Basin and form the source area of the radially draining rivers; their deep, often troughlike valleys separate the several mountain groups. (Mt. Goeller, 1,766 m; Mt. Kraeuterin, 1,919 m; Mt. Zellerhut, 1,639 m; Mt. Duerrenstein, 1,878 m, Mt. Oetscher, 1,894 m). The western part of these groups is also called the Lassing Alps.

The Gesaeuse mountains (Enns Valley Alps) were cut up into several bosses as a result of strong valley formation (Gesaeuse Gorge, Pyhrn Pass, Buchau Saddle); only here and there do we find small residual surfaces above high walls which drop down to the Enns River Valley; Mt. Hochtor and Mt. Planspitze point S with their diagonally inclined layers, while Mt. Buchstein and Mt. Tamischbachturm point N. There are also many small aretes (Mt. Hochtor, Mt. Planspitze).

The Totes Gebirge Mountains, the Tennen Mountains, the Hagen Mountains, Mt. Untersberg, Mt. Hoher Goell, and the Steinernes Meer Mountains offer a similar picture: karst surfaces above high walls, diagonally inclined layers. The Tennen Mountains are known for their many ice caves. The plateau of Mt. Hochkoenig (2,938 m) holds the only plateau glacier in the East Alps ("Uebergossene Alm").

The plateau of Mt. Dachstein (2,996 m) is 87^{0} sq km large; only the trough of the Gosau Valley with its ladder of lakes eats into the mass of this plateau.

This huge boss has six glaciers which drain underground; five of these glaciers, among them the Hallstatt Glacier, lie on the northside; since the cirques are separated from each other by steep aretes, the several peaks jut out noticeably; they are located around plateaus revealing karst formations; in the northeastern part of the huge Dachstein caves.

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In the Lofer and Leogang Rock Mountains (2,511 to 2,634 m), west of the Salzach, glacial erosion transformed the plateau noticeably; the mountains are characterized by cirques lying between 300 to 500 m high aretes.

Out of the surrounding valleys the mass of the Kaiser Mountains (2,344 m) rises abruptly; the northern, lower chain of these mountains has a small plateau which descends toward N, while the southern chain has an indented arete. In general one can say that the valley furrow of the Grosse Ache [river] separates the plateau mountains in the E from the mountain chains in the W. On the left bank of the Inn Rover, toward Lake Achen, we again find small plateaus, partly destroyed by cirques, in the Sonnwend Mountains; the Karwendel Mountains however consist of narrow, 2,300 to 2,700 m high chains arranged in the form of a grill; the Wetterstein Mountains (Mt. Zugspitze, 2,968 m), the Mieminger Mountains (2,759 m), and Mt. Tschirgant (2,372 m) present the same picture. The deeply cut passes (Seefeld Saddle, 1,185 m; Scharnitzer Klause, 957 m; Ehrwald Saddle, 910 m; Fern Pass, 1,209 m; Nassereith Saddle, 1,126 m) and the comparatively wide hollows of the Isar River tributaries clearly separate the various groups.

Almost all major rivers of the North Tirol Limestone Alps drain northward; the source area of the Loisach River was lost as far as the Inn River is concerned due to a rock slide on Fern Pass and the Achen Valley was similarly lost due to glacial blocking.

The Lechtal Alps, the Allgaeu Alps, and Mt. Raetikon are about equally high; their peak formations are rather varied due to the heavy representation of marl rocks and the frequently steep inclination of the layers; deep cuts in aretes separate the peaks. Along the rock boundary

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(limestone in the N, crystalline in the S) lies Arlberg Pass, 1,800 m, which is very important to transportation routes. In the Lechtal Alps, at whose western end the Flexen Pass (1,784 m) makes possible the road connection between the Kloster Valley and the Lech Valley, lies the highest elevation of the northern Limestone Alps, Mt. Parseier Spitze (3,033 m). The limestone mass of Mt. Raetikon lies S of the Ill River Valley and bears Lake Luener, the largest cirque lake of the East Alps. The pasture zone is larger there and the forests are not as big as in the E.

All groups of the limestone Alps have many caves. We have already mentioned a few of them. Let us just give the number of caves in several limestone bosses: Mt. Rax, 22; Mt. Schneeberg, 9; Mt. Hochschwab, 30; the Totes Gebirge Mountains, 38 (the Salzofen Cave near Bad Aussee with its prehistoric finds is well known); Mt. Untersberg, 75; Tennen Mountains, 117; Hagen Mountains, 32; Steinernes Meer Mountains, 22. The presently known third-deepest natural shaft of the world, 527 m deep, is located in the Tonion section near Mariazell (according to doctor Franz Waldner).

3. The Central Alps

From the eastern end of Mt. Raetikon we can trace the dividing line between the Limestone Alps in the N and the predominantly crystalline Central Alps in the S near Tschagguns straight across the Montafon valley section; near Dalaas it reaches the valley line Kloster Valley -- Arlberg Pass -- Stanzer Valley -- Sanna Valley -- Inn Valley. The Central Alps begin in the W with the Silvretta Group, a border range whose highest parts (Piz Buin, 3,312; Mt. Fluchthorn, 3,403 m) are covered with glaciers. The Ferwall Group rises N of this area in the corner between the Montafon valley section and the Paznaun Valley; only a few of its peaks are barely higher than 3,000 m.

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The mixture of gneiss and red slate produces peculiar formations; aretes, sharp obelisks, and matterhorns dominate the scene. Here we already find a star-shaped radiation of secondary ridges from a common central point.

The Oetz Valley Alps are a classic example of boss-shaped or star-shaped structures with radial drainage; they are the most massive mountains of the Central Alps in Austria.

The nucleus of the mountains is subdivided by mighty collecting basins because seven elevations over 3,500 m rise in this area. The Oetz Valley Alps have the most glaciers of the East Alps (approximately 350 sq km). The Gepatschenfern Glacier, as the Pasterze Glacier of the Mt. Grossglockner Group, is one of the longest glaciers of the East Alps (approximately 10 km) (all length and surface data on glaciers were established around the turn of the century).

The longest secondary ridges of the mountains run northward between the Kauner Valley, the Pitz Valley, and the Oetz Valley; from the glacier fields rise the peaks that are shaped like pyramids (Mt. Similaun, 3,602 m) or take the form of snow-covered knolls (Mt. Wild spitze, 3,774 m; Mt. Weisskugel, 3,736 m).

Similarly shaped, though less massive are the Stubai Alps (Figure 2); the main ridge describes a wide arc around the source valleys of the Stubai Valley. Seven peaks over 3,400 m high (Mt. Zuckerhuetl, 3,507 m) tower above the heavily glaciated central portion. The very important Brenner furrow (Wipp Valley, Brenner Pass, Eisack Valley) forms the eastern boundary.

In the eastern part of the otherwise granite-gneiss containing mountains consists mostly of Triassic limestone from which rise among others

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Mt. Tribulaun (3,096 m) and, S of Innsbruck, the Kalkkoegel Mountains, Mt. Saile (2,406 m), and Mt. Waldrastspitze (Mt. Serles, 2,718 m), called the "most beautiful mountain of the Alps" by the geographer Alexander von Humboldt (died 1859).

The southside of the Oetz Valley Alps and of the Stubai Alps is in Italy. The Jaufen Pass separates the Stubai Alps from the Sarna Valley Alps which surround the Sarn Valley.

There the peaks are as high as 2,700 m, though there are no glaciers and though they consist of slate and of quartz porphyry in the S. There are pastures on their mostly round formations up to the very top.

The counterpart of the Oetz Valley Alps is the Ortler Group, located S of the Vintschgau area, which also has a star-shaped structure and whose central portion is enveloped by huge ice fields; 98 glaciers cover an area of 190 sq km here. Mt. Ortler (3,899 m) consists of a limestone block. The height of the Ortler Group looks all the more impressive when viewed against the deep troughs of the Vintschgau area in the N and the trough line formed by the Noce Valley (Val di Sole, Sulzberg Valley) -- Tonale Pass (1,883 m) -- Oligo Valley line in the S. The Adamello-Presanella Group, located S of the Tonale Pass, is very impressive by virtue of its massiveness, height, structure, and heavy glaciation; it consists of tonalite, a type of granite.

The Inn Valley -- Nauders Valley -- Reschenscheideck Pass -- Trafoi Valley -- Stilfser Saddle -- Adda Valley trough line separates the Ortler Group from the Raetische Alps.

Reschenscheideck Pass (1,508 m) (the local name is "Reschen Pass," "Passo Resia" being the Italian version) is a wide valley watershed which was

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scooped out by a branch of the ice age Inn Glacier; the lakes of the Etsch source area were blocked by a rubble cone. From 1920 to 1924 a road was built over the Stilfser Saddle (2,757 m) which was a greatly admired achievement of the Austrian government at the time.

East of the Brenner trough rise the Zillertal Alps which are divided into the northern Tuxer Ridge and the southern Ziller Ridge by the Ziller Valley -- Pfitscher Saddle (2,251 m) trough; both consist of granite gneiss and mica schist and have a pronounced feather-shaped, though uneven structure; both are heavily glaciated.

Due to its great length -- 20 km for the Tuxer Ridge and 28 km for the Ziller Ridge -- the total glaciated area is larger than that in the Stubai Alps; from the grey and brown rubble hollows rise high peaks which in the Tuxer Ridge (Mt. Olperer) reach 3,480 m and in the Ziller Ridge (Mt. Hochfeiler) 3,510 m.

The Gerlos Valley -- Gerlos Pass (1,507 m) -- Salzach Valley trough clearly separates the Zillertal Alps from the Kitzbuehler Alps toward N. The Krimml Valley, the Krimml Tauern Mountains (2,633 m), or Mt. Birnluecke (2,667 m; "G'biriluka" meaning mountain gap), and the Ahrn Valley form the boundary between the Zillertal Alps and the Hohe Tauern Mountains. The latter were named for the local term for saddles which lead the traveller across the mountains at 2,400 to 2,700 m elevation and which divide the mountains into heavily glaciated groups. The heaviest glaciation is found in the Mt. Venediger Group (more than 150 sq km); the Mt. Granatspitz Group and the Mt. Glockner Group have glacier areas of 120 sq km each. In the Mt. Glockner Group we find the largest glacier (the Pasterze Glacier, 30 sq km large), the highest peak (Mt. Grossglockner, 3,797 m) and the highest situated road (Mt. Hochtor, 2,505 m) of the Austrian Alps. (Mt. Grossglockner was first climbed on 29 July 1800 by a

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five-man group from a 62-man expedition.) In the Mt. Sonnblick Group (Mt. Goldberg Group) we find Austria's highest weather station at 3,105 m. The Mt. Ankogel-Hochalmspitz Group (3,253 m) surrounds the source area of the Malta River. Mt. Hafner (3,076 m), the eastern pillar bears the last glacier of the Central Alps. The Hohe Tauern Mountains split in the source area of the Mur River and end on Mt. Murtoerl (2,263 m) in the NE and Mt. Katschberg (1,641 m) in the SE.

The Hohe Tauern Mountains consist of the same rock types as the Zillertal Alps, although slate predominates so that we can speak of a "slate envelope" of the Hohe Tauern Mountains; this envelope caused great difficulties in the construction of the Mt. Grossglockner High Alpine Road. The tunnel of the Tauern railroad leads through granite gneiss which is very noticeable in the eastern part of the mountains. The Hohe Tauern Mountains also have the same sort of feather-shaped structure as the Zillertal Alps. The parallelism of the ridges and valleys is especially noticeable on the northside; the valleys reveal regular steps, smooth trough walls, and waterfalls; quite often they end in big gorges such as those of Gastein, the Raurische Ache [river], and the Grosse Arl (Liechtenstein Gorge) which were partly brought about by a limestone strip which runs along the northern foot of the mountains.

The secondary ridges and valleys on the southside have a different shape. The Isel, Moell, and Lieser valleys and their tributaries cut off mountain groups which are separated from the main ridge of the Hohe Tauern Mountains only by high saddles and which lie in the S, in front of this main ridge. The secondary branches of the Mt. Grossvenediger Group extend farthest of all; they run parallel to the main ridge and form high-mountain-type groups situated in front of the ridge. The Mt. Rieserferner or Mt. Hochgall Group (3,435 m), a tonalite boss, is heavily glaciated. The

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mica schist ranges of the Defereggen Mountains and of the Mt. Schober Group (3,240 m) reveal manifold peaks and aretes; similar to these are the groups of Mt. Kreuzeck (Polinik, 2,784 m) and Mt. Reisseck (2,959 m, gneiss).

In the N of the Hohe Tauern Mountains, between the Zill Valley and the furrow of Lake Zell, we find the Kitzbuehler Alps.

They are part of the slate orgraywacke zone which consists of Paleozoic rocks (including quartz porphyry, various kinds of slate, graywacke, limestone, and dolomite); this zone constitutes a rather narrow strip between the northern Limestone Alps and the Central Alps.

This zone begins in a clearly recognizable manner at the Brenner col with the Tuxer Slate Mountains, continues with the Kitzbuehler Alps, and extends to the Enns River E of Lake Zell; it becomes broader in the Eisenerz Alps and ends in a narrow strip on Mt. Semmering. This zone is economically important because it contains iron ore, copper ore, and magnesite deposits.

The largest section of the graywacke zone is represented by the Kitzbuehler Alps. Its northern parts are divided into several mountain groups by the Hopfgartner Ache and the Kitzbuehler Ache; these groups, e.g., Mt. Heoh Salve (1,827 m) and Mt. Hahnenkamm (1,655 m), are famous scenic observation points. The same is true of Mt. Schmittenhoehe (1,965 m), the eastern end of the range. The Thurn Pass (1,274 m) is an important passage way from the Salzach Valley to the N. The broad, rounded ridges of the Slate Alps bear vast pastures ("Grasberge" /grass mountains/); sharp peak formations (Mt. Kitzbuehler Horn, limestone; Mt. Grosser Rettenstein, dolomite) occur where limestone has overfaulted. The broad longitudinal valley furrows running in a W -- E direction from Woergl to Saalfelden are very noticeable; the valley floors of these furrows, with their moraine

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ruble and large rubble cones, favor settlement and transportation. The Hochfilzen Pass (959 m) and the Griessen Pass (941 m), situated in the northern Limestone Alps, constitute wide plateaus. The longitudinal furrows make up a distinct boundary against the Limestone Alps.

The Niedere Tauern Mountains describe a wide arc from Mt. Murtoerl to the broad col formed by the line Palten Valley -- Schober Pass -- Liesing Valley. They are clearly separated from the Limestone Alps by the Fritz Valley and the Enns Valley and from the other parts of the Central Alps by the Mur Valley. Like the Hohe Tauern Mountains, they consist of gneiss and mica schist and therefore look like them; the Niedere Tauern Mountains however are not glaciated. Mt. Hochgolling (2,683 m), the highest point, lies in the Schladminger Tauern Group.

Ice age glaciation left its traces in the form of cirques, cirque lakes, and trough valleys with steps. The Niedere Tauern Mountains have the largest number of cirque lakes in the Alps. Their feather-shaped structure is even more pronounced than in the case of the Hohe Tauern Mountains.

Though the Niedere Tauern Mountains are more readily negotiable, there are only two, albeit very old roads leading over the divide. In the W there are the Radstaedter Tauern Mountains (1,739 m) whose approach valleys significantly bear the same name both in the N and in the S, i.e., "Taurach Valley"; this is the connection between the Lungau and Pongau areas. In the E the "Tauern Road" leads over the Rottenmanner Tauern or Hohentauern Mountains (1,256 m) from the Poels Valley, which penetrates deepest into the mountains, to the Palten Valley and then runs into the road over the Schober Pass.

Though they do not form distinctly separate groups, the groups of the Niedere Tauern Mountains take their names from the most important market

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towns of the valleys, e.g., Radstaedter, Schladminger, Woelzer, and Rotternmanner Tauern and Seckauer Alps.

East of Walter Heights (Schober Pass) lie the Eisenerz Alps and E of Mt. Prebichl the Brucker Alps. The former are richer in their formations due to the many rock types; above the rounded, wooded mountains of Paleozoic slate tower the highest peaks in the form of limestone knolls (Mt. Goesseck, 2,215 m; Mt. Eisenerzer Reichenstein, 2,166 m).

Due to their rock types (slate gneiss and granite gneiss) and due to their lower elevation, the Brucker Alps reveal wooded, rounded formations up to the very peaks which contrast against the white, abrupt walls of the Limestone Alps behind them. The boundary against the latter is not formed by a definite depth line; it leaves the Enns Valley and in the form of a valley furrow only here and there runs along the line Johnsbach -- Radmer -- Eisenerz -- Aflenz -- Neuberg. Between the Brucker Alps and the Limestone Alps we find the small basins of Trofaiach and Aflenz.

The southeastern wing of the Central Alps begins with Mt. Katschberg in the Gurktaler Alps between the Mur and Drau rivers. Broad, wooded, and pasture-covered ridges, locally called "Nocke," predominate as a result of the uniform rock type (slate). High mountain formations with cirque lakes and step valleys are found only in the higher parts in the area of Mt. Eisenhut (2,441 m) and Mt. Koenigsstuhl (2,331 m). The Gurk River and its tributaries divide the Gurktaler Alps into several groups, making for rather easily passable country; there is a road leading over Turracher Heights (1,763 m). We find more lakes in the southern part: Lake Millstatt, Lake Brenn, Lake Afritz, and Lake Ossiach, all of which were formed by the ice age Drau Glacier (scooping of basins, blocking due to moraines). The col formed by Neumarkter Saddle and the Olsa, Metnitz, and Gurk valley line constitutes the distinct eastern boundary of the Gurktaler Alps.

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E of these broad cols we find several groups of the Central Alps which partly intertwine at Obdacher Saddle (945 m); the latter connects the Mur Valley with the Lavant Valley and thence with the Drau Valley. The Seetaler Alps in the NW received their name from the many cirque lakes in the higher parts of the broad ridge where mica schist in places forms heavily rubbled aretes (Mt. Zirbitzkogel, 2,396 m) which are bordered by a broad pasture belt. More uniform is the ridge of the southward-trending Saualpe Mountain which reveals no high mountain formations whatever.

Parallel to the Obdacher Saddle -- Upper Lavant Valley line of strike, the Packalpe range rises in the E, joined in the NE by the Stubalpe, Gleinalpe, and Hochalpe mountains belonging to the gneiss arc swinging from Mt. Stuhleck to Mt. Koralpe. Wooded valleys cut into this ridge which is rich in pastures and has few subdivisions.

Toward the S Mt. Packalpe runs into Mt. Koralpe (2,144 m) which precipitately drops to the Lavant Valley basin; the latter is considered a geosynclinal basin. Mt. Saualpe and Mt. Koralpe are desk-shaped ridge faults. Woods and pastures dominate the landscape. Wooded ridges shoot off from Mt. Koralpe toward SE; they border the Kainach and Sulm river area and break off abruptly along the line Eibiswald -- Deutschlandsberg -- Stainz -- Koeflach. East of this line we come to low hill country (500 to 300 m) with rich lignite deposits of the Tertiary sea; a few heights of the sunken basal complex, which consists of Paleozoic limestone and slate, rise in the form of individual mountains (Mt. Sausal, 760 m; Mt. Wildoner Schlossberg, 551 m).

The continuation of Mt. Koralpe is formed on Yugoslav soil by Mt. Possruck and the wooded granite gneiss mountains of Mt. Bachern (Bacher Mountains).

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East of the Mur River the Gleinalpen Range continues in the form of the wooded Fischbacher Alps which consist of gneiss and slate. The latter run along the Muerz Valley in the E; their northern end is formed by Mt. Stuhleck (1,783 m), the easternmost mountain with cirque formations in the Central Alps.

Going further E, we run into the broad ridge of Mt. Wechsel (1,738 m), the last peak of the Central Alps which has pastures ("Schwaigen").

Mt. Stuhleck and Mt. Wechsel lead into the Mt. Semmering landscape. Semmering Pass (985 m) constitutes the end of the tectonically traced longitudinal valley furrow of the Muerz Valley.

Like mighty steps, two plateaus lie in front of Mt. Wechsel in the E and S: in the E we have the Bucklige Welt Plateau, a heavily cut plateau 600 to 900 m high, whose valley slopes and round knolls bear woods and whose ridges bear fields. Here, on Burgenland soil, towers Mt. Pauliberg, the wooded chimney of an old volcano with which begins the series of volcanic mountains along the eastern fringe of the Alps. Looking like uplands, the Bucklige Welt Plateau juts out toward E where it ends in wooded Mt. Geschriebenstein (883 m); this is the easternmost point of the continuous mass of the Central Alps. The island-shaped range of the Leitha Mountains constitutes the connection with the Carpathians.

S of Mt. Wechsel and SE of the upper Feistritz River spreads the hill country of the Styrian Bucklige Welt Plateau, the so-called "Joggl-land," the second major step. A few gneiss heights reach up to 1,200 m. They are joined to the W of the Feistritz River by the Raabtaler Alps, the source area of the Raab and its western tributaries; Paleozoic limestone knolls (Mt. Hochlantsch, 1,722 m; Mt. Schoeckl, 1,445 m), with

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many caves tower over the 900 to 1,300 m high wooded mountain landscape.

The crystalline mountain ridges E of the Muerz, Mur, and Lavant rivers, from Mt. Wechsel to the Bacher Mountains are lumped together under the name "Styrian Fringe Mountains" [Steirisches Randgebirdge]. The latter surrounds the East Styrian (Styrian-Burgenland) Hill Country which connects with the lower extension of the valley fan of the Raab river tributaries and consists entirely of deposits of the Tertiary sea.

The Klagenfurt Basin, the largest in the East Alps, lies between the Central Alps and the South Alps; it is roughly delineated by the line Villach -- St. Veit -- Bleiburg -- Ferlach -- Villach.

4. The South Alps

The South Alps consists mostly, especially on Yugoslav soil, of limestone so that they can be called the Southern Limestone Alps with full justification.

The southeastern pillars of these high mountains -- located in Yugoslavia -- are the Steiner Alps whose mighty rock peaks rise to more than 2,500 m (Mt. Grintovec) from the vast beech forests around the base and which have few pastures. They are joined by the Karawanken Range which extends to the Gailitz Valley and whose eastern piedmont peak is Mt. Hochobir (2,142 m). They are noticeably uniform and have abrupt walls with mighty rubble hollows which extend down into the forest region. The peculiar mountain formations are indicated by the names of the mountains (Mt. Hochstuhl, 2,238 m; Mt. Kosuta (meaning "tower"), Mt. Mittagskogel, etc). There are three roads -- one via Seeberg Saddle (1,218 m), the second via Loibl Pass (1,368 m), and the third via Wurzen Pass (1,073 m) -- which connect the Klagenfurt Basin and the Laibach Basin to the S.

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After the Karawanken Mountains, beyond the national frontier, in the group of passes near Tarvis (Saifnitzer Saddle in the W, 804 m; Predil Pass in the S, 1,156 m; Weissenfelser Saddle in the E, 854 m), we come to the Julian Alps which extend S and are much higher (Mt. Triglav, 2,863 m); they constitute the second southeast pillar of the high mountains and surround the sources of the Isonzo and Save rivers in the form of a massive limestone range with rock walls and rubble hollows. Here we find Ternovan Forest which extends to the Karst area.

The Carnic Alps begin W of the Gailitz River; they consist of the southern graywacke zone with a superposed limestone zone from the Paleozoic and Triassic. The steep limestone peaks are almost 2,800 m high (Mt. Hohe Warte, 2,780 m); pastures are spread out on slate rock. The valleys leading to the Gail River are short and steep. The Carnic Alps, 100 km long and 15 km wide, are the slimmest mountain range of the East Alps. Ploecken Pass (1,360 m) was used already by the Romans.

Parallel to the Carnic Alps we find the Gailtaler Alps which consist of Mesozoic limestone and graywacke; they fill the two triangles formed by the Drau River and the straight Gail Valley. The eastern part, the Gailtaler Alps proper, is lower and ends in the limestone knoll of Mt. Villacher Alpe (Mt. Dobratsch, 2,167 m), the "Mt. Rigi of Carinthia." Lake Weissen is intrenched in the Gailtaler Alps. West of the low Gailberg Saddle (982 m; Oberdrauburg -- Mauthen road) lie the Lienz Dolomites which are locally called "the monsters" because of their mighty, jagged peaks.

The remaining parts of the southern Limestone Alps are outside Austria. The South Tirol Dolomites, extending to the line Sexten Valley -- Mt. Kreuzberg (1,636 m) -- Piave River -- Val Sugana, reveal the greatest variety of formations and colors.

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Despite the name they bear, they are not exclusively made up of dolomite; in the W we find, rising out of an approximately 1,200 to 1,600 m high, heavily canyoned porphyry plateau, the towers and pinnacles of Triassic limestone and dolomite blocks (Mts. Latemar, Rosengarten, Langkofel, Sella, glaciated Mt. Marmolata (3,342 m), the Pala Group, etc). In the S rises the granite boss of Cima d'Asta (2,848 m). Triassic limestone forms mighty bosses in the Ampezzo and Sexten Dolomites (Monte Cristallo, 3,216 m; Mt. Drei Zinnen, Mt. Tofana, etc). The much travelled roads over the various Dolomites passes leading to Bolzano were built by the Austrian government prior to 1918.

5. The Vienna Basin

According to its origin, the Vienna Basin is a geosynclinal basin running from SW to NE between the Alps and the Carpathians. It is approximately 150 km long between its terminal points at Neunkirchen and Napajedl N of Hodonin on the March River; between the Vienna Gap and the Hainburg Gap it is approximately 60 km wide.

The approximately 4,000 sq km large connecting part between the Alps and the Carpathians began to break down during the middle Tertiary, the Miocene (Table 12; [page 219 of original]), while the Alps and the Carpathians rose. The Crystalline Zone -- drilling revealed crystalline bedrock at a depth of 1,412 m in the Wiener Neustadt Gate -- and the Limestone Alps Zone were buried chiefly S of the Danube; the flysch and Limestone Alps zones were buried chiefly N of the Danube in the area between the Mt. Bisamberg Range, the Falkensteiner Mountains, and the Carpathians. Bedrock was struck in the center of the basin (alpine limestone) near Aderklaa at a depth of 2,726 m.

The line of disturbance is proved by the thermal springs appearing along the eastern and western edges, especially in the southern part.

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Subsequent subsidences along the edges took place during the Pliocene; this is proved by the downthrust and slanting of the brown coal layers in the Wiener Neustadt Gate area. Many breaks and cracks were established through drilling especially in the interior of the area. Many earthquakes, confined to the fault lines along the edge of the basin, attest to the continuing changes.

In the large basin a sweet-water lake formed in the beginning; its brown coal deposits are located at Hart near Gloggnitz and at Leiding near Pitten. Later the Mediterranean Sea (Tortonian) pushed from SE into the area which continued to drop; in the flat lake formed in this manner sand and clay were deposited in the center and present-day Leitha limestone and conglomerates were deposited along the edges. All troughs situated on Alpine-Carpathian soil were separated from the sea as a result of earth crust movements in the SE of Europe and Asia Minor during the Sarmatian, the last step of the Miocene. The sea became brackish. The surf transformed the Leitha limestone partly into calcareous sandstone; in the interior the sand and clay were replaced with a different fauna. The Sarmatian sands account for a considerable part of the petroleum and natural gas in the eastern Carpathian Foreland. During the subsequent Pannonian, the first step of the Pliocene, the great lake was completely cut off from the sea and filled with sweet water by the rivers. As a result there occurred another change in the fauna. Rough shore formations and gravel were deposited along the edges of the basin; in the interior sands, clay, and marl were deposited. Brown coal deposits developed along the edge of the Wiener Neustadt Gate.

The water level changed repeatedly in the various phases of basin formation. The subsidence of the basin bedrock gradually came to a standstill and the continuing filling process brought sediments which caused the interior of the basin to turn into land.

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The fringe areas of the basin were terraced as a result of the varying water level.

This is particularly clear in the southern part. The highest terrace was established at 540 m. Straits became especially pronounced at an elevation of about 350 m. The Leitha Mountains and the Hainburg Mountains were islands or at times shoals, when they were flooded.

Rivers deposited gravel on top of the sea deposits. Danube gravel was superposed on the northern edge of the southern part of the basin as early as toward the end of the Pliocene; this protected the sediments below against erosion. The rubble surfaces were cleaned out again in part by a predecessor of the Danube when the erosion base was moved further down. Rubble deposit and rubble removal followed each other repeatedly during the ice age. This resulted in the lower terrace landscape in the Vienna area (Figure 11) and in the partly terraced gravel surfaces in the March Plain area. Ice age predecessors of the Schwarza Pitten, and Piesting rivers poured huge gravel masses into the southern end of the basin.

In the area E of the Mt. Bisamberg Range and the Falkensteiner Mountains, like the rest of the Carpathian Foreland, is covered by river-deposited gravel fans, sand, and clay plus a strong loess layer. For this reason as well as due to its location this landscape is considered to be part of the Carpathian Foreland. The plain between the March River and the Carpathians, which belongs to the Vienna Basin structurally, lies outside Austria.

The March Plain, a broad river plain of the Danube, is part of the Vienna Basin on Austrian soil, N of the Danube; for this reason it can also be included in the Danube landscapes (see page 41). The triangular part S of the Danube is called Vienna Bay or Wiener Neustadt Bay.

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The gravel surfaces S of the Danube are penetrated by the Schwechat and Fischa rivers and are thus divided into three groups: that of Mt. Wienerberg and Mt. Laaerberg, that of the Rauchenwarther Plateau, and the Koenigsberg -- Ellender Forest. In the so-called "wet plain" adjoining to the S there is no gravel; instead, Pannonian clay marl turns up; as a result the terrain is very damp and partly swampy. The southern part is taken up by the Steinfeld Plain with its large gravel surfaces; it is called the "dry plain." The water bodies flowing on top lose much water to the groundwater stream which comes out at the southern edge of the wet plain and produces heavily ramified network of water bodies.

B. The Foreland in the East

The development of the Vienna Basin is only a partial phenomenon of the great changes which occurred along the eastern fringes of the Alps since the middle Tertiary. Here, at the flexure point of the strike line, the parts connecting the Central Alps and the interior of the Carpathians crashed into the depths. The Eisenstadt Basin, the Pullendorf Basin, and the Graz Bay, as the hill country in southern Burgenland and southeastern Styria is called by the geologist, developed along the edges of the Alps.

The boundary against the mountains is formed by the line Rechnitz -- Friedberg -- Hartberg -- Weiz -- Graz -- Voitsberg -- Deutschlandsberg and the eastern edge of the Possruck Mountains and the Bacher Mountains. The Hainburger Mountains, the Leitha Mountains, Mt. Rosalia, and the Rust Hill Range, as well as the Oedenburger Mountains and the Guens Mountains remained as heaved blocks.

The great geosyncline which extends into Yugoslavia and Hungary was filled with the same sediments as the Vienna Basin.

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In Styria the beach terraces are situated considerably higher than in the Vienna Bay since the fringe area of the mountains was raised further. Leitha limestone was also deposited along the Rust Hill Range and near Leibnitz. Many fault lines run through the bed rock. Here we find the warm springs and carbonated springs of Burgenland and the mineral springs of Styria. Young Tertiary falling and downthrusts took place well into the ice age. Earthquakes in certain zones, especially in Burgenland, prove that the interior of the geosyncline has likewise not come to rest as yet. Great coal deposits developed along the fringes, e.g., near Koeflach-Voitsberg, Eibiswald-Wies, Oedenburg, Tauchen, Ritzing, Weiz, Fuerstenfeld, etc.

Volcanic formations in the shape of volcanic cones or lava streams branched off from the Vienna Basin in an arc-shaped zone strip from Mt. Stradner Kogel near Gleichenberg to Mt. Pauliberg in central Burgenland; over 40 eruptions are known there.

The ice age rivers deposited masses of gravel; terraces remained during the subsequent clearing process.

The present landscape offers little variation. The gravel terrace of Parndorf Heath lies approximately 50 m and that of the Seewinkel area lies about 15-5 m/[sic] above the present level of the Danube. Shallow, salt-containing Lake Neusiedel seems to lie in the area of a very recent depression.

Adjoining this area, the Raab and Mur rivers and their tributaries cut up the Tertiary hill country into an interstream plateau topography with broad valley benches and wide valley floors; this part gradually dips SE from an elevation of 500 m and forms the transition to the Upper Hungarian Plain. The volcanic elevations rise quite characteristically; many of them were ideal locations for castles (Kapfenstein, Gleichenberg, Riegersburg, Guessing).

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The Mur River flows through a broad plain covered by ice age deposits. The block of Wildoner Mountain divides the plain into the Graz Field in the N and the Leibnitz Field in the S.

South of the Mur River the Tertiary hill country continues via the Windische Bueheln plugs on Yugoslav soil.

C. The Alpine Foreland

The area between the northern edge of the Alps and the Danube is called the Alpine Foreland; the Danube also cuts off small parts of the Muehlviertel area and the Waldviertel area which are included in this section. The entire section is 260 km long and 10-20 km wide on Austrian soil.

The flysch zone of the Alps runs into unruly hill country (600-300 m) with knobs, ridges, and small basins as well as irregular water bodies; in the N the zone changes into gently undulating laths which run along the rivers and larger brooks. Only the feather-shaped wooded ridge of Mt. Hausruck (800 m) and the broad Kobernauser Forest (752 m) rise in this area in the form of an upland area.

The western part of the area up to the Enns River consists partly of ice age moraine rubble, partly of slate-like, blue-grey, marly-sandy rock, called schlier.

Drillings near Wels, which struck bedrock at depths of 1,036 m and 1,240 m, disclosed that the schlier is over 1,000 m thick there; it contains the iodine springs of Bad Hall, the hot springs of Schallerbach, and certain natural gas deposits which are used for heating purposes in Wels.

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Schlier is also found on the valley bottoms of the rivers. It is considered a neritic formation of the Tertiary fringe sea (Molasse sea) of the Alps; along the S edge it is superposed by flysch and was also folded there. Here and there it is superposed by hard sands which are poor in clay (e.g., Melk sand) and which in some places were consolidated into sandstone; the latter was quarried for use in millstones (Perg, Wallsee).

The moraine hills between the Salzach River and Mt. Hausruck belong to the ice age Salzach glacier; the moraine hills on the N end of Lake Atter and of Lake Traun belong to the Traun glacier; in the area of Kremsmuenster the terminal moraines of a branch of the Enns glacier, which pushed over Pyhrn Pass, virtually form an amphitheater.

Along the rivers we can trace certain distinct steps and terraces which however are not everywhere preserved in their original sequence; the elevations which form the watersheds, when viewed from afar, look like a plain so that one can speak of "plateaus" located between the main rivers such as the Inn, the Traun, the Ybbs, the Erlauf, and the Traisen; the largest plateau is the "Traun -- Enns Plateau." One can clearly distinguish two steps differing in elevation by about 20 to 30 m, which frequently bear the name "Eben" and which in scientific language are called high terraces and low terraces; the low terrace is loess-free while the high terrace is rich in loess in addition to erosion loam. The many gravel pits along the slopes show that both terraces are made up of river gravel.

During every advance of the glaciers the water volume was tremendous due to higher precipitation; in this connection gravel masses were piled up in the form of flat surfaces in the valleys and foothills. As the water volume shrank, a deep-reaching and powerful clearing process

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took place during the warmer interim periods; this clearing action was supported by the general rise of the Central European area and by the worldwide drop of the sea level. The remnants of old gravel masses today constitute terraces.

The valley floors are rich in water and are often covered by swampy meadows. The Alpine Foreland consists mostly of fields; the woods are mostly small patches, so-called "Schachen." Only the gravel floor of the low terraces is often covered with pine and fir forests, e.g., Weilhart Forest near Mattighofen, and Forst Heath near Amstetten; the name "Steinfeld" [stone field] S of St. Poelten also speaks for the particular type of soil.

Mt. Hausruck and Kobernauser Forest also consist of gravel which is rich in quartz pebbles and lies on schlier at a thickness of 100-200 m.

The gravel of Mt. Hausruck and of Kobernauser Forest is considered a remnant of a gravel surface which covered the foothills like a blanket and extended as far as across the edge of the Muehlviertel area.

The sea, the ice age glaciers, the rivers, and the wind shared in the shaping of the base and formations of the Alpine Foreland.

D. The Carpathian Foreland

The NE part of Austria between the Manhartsberg Range, the Danube, and the March is a zone of transition between the Bohemian Massif, the Alpine Foreland, and the Alps on the one hand and the Carpathians on the other hand. This area is also called the "hill country below Mt. Manhartsberg," popularly referred to as the "Weinviertel" area.

It consists of low hill country 200-400 m high and has wide synclinal valleys and small valley basins. The Danube plains bulge into

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the area for instance in the form of the Tulln Plain and the March Plain. In the N the Laa Plain is the largest flat area of the region. A few buttes rise between 100-200 m above the hill country. They form the continuation of the Vienna Woods (the long-drawn-out flysch hills of the Rohrwald Range and the Mt. Bisamberg Rango), extend from the Leiser Mountains to the Pollauer Mountains in Moravia in a markedly straight line running almost parallel to the Manhartsberg Range, and consist mostly of Jurassic limestone (Leiser Mountains including Mt. Buschberg, 492 m; Falkensteiner Mountains, 425 m; Pollauer Mountains, 550 m).

The bedrock W of the cliff zone consists of weathered deposits of the Tertiary sea (sand, marl, schlier) and river gravel. Successful drillling in the bedrock E of the cliff zone disclosed petroleum and natural gas. It was established first of all that there are flysch ridges in the deep layers which lie between the Alpine and Carpathian flysch in the form of a downfaulted link and that, in conjunction with this part, the area is crossed by breaks running in all direction and that downthrusts took place at great depths. This is also indicated by the mineral springs. The depression which, in a geological sense, is formed by the Vienna Basin, was filled up with the same sediments as the basin part S of the Danube.

The soil east of the cliff area consists, as mentioned previously, of river gravel, sand, and clay which are extensively covered with loess, a very fine-grained, unstratified, and calciferous dusty sand. The latter was blown to this area from moraines and river deposits during the ice age. In some places it is up to 30 m thick.

The loess deposits here and there considerably flattened the soil relief. In them we find deeply cut dry valleys (gullies). In the loess

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area the valleys often have uneven slopes since the deposits were made mostly on the slope away from the wind.

The tributaries of the Danube and March rivers flow in broad-bottomed, step-like valleys. The hill country has many valleys but is poor in running water. In addition to the climate, the loess and sand soil is one of the major factors in the extensive viniculture of the area.

E. The Bohemian Massif Part and the German Uplands Part

Austria has on its territory a section of the German Uplands in the form of the SW edge of the Bohemian Forest and the SE part of the Bohemian-Moravian Heights. Thus the southern corner of the great square formed by the old continental mass of Bohemia belongs to Austria. Therefore these uplands, which extend to Mt. Manhartsberg in Lower Austria, are called the "Bohemian Massif."

The Upper Austrian part is called the Muehlviertel area after the Muehl River; the Lower Austrian part is called the "Waldviertel" area since forests predominate here.

The Bohemian Forest, its main ridge forming the international frontier, extends into Upper Austria in the form of Mt. Ploeckenstein (1,378 m) and Mt. Hochfichtel (1,337 m) and ends in Mt. Sternstein (1,125 m) at a saddle over which flows the Feldaist River; here Kerschbaumer Saddle (685 m) connects the Danube area with Bohemia.

The highlands S of the Gmuend Gap (491 m) in the border area are as high as 1,000 m. The mountain ranges change into undulating hill country 900 to 400 m high which in the W consists of coarse- and fine-grained granite up to the line Isper -- Zwettle -- Kautzen; E of this line gneiss and mica schist predominate; they are deposited in the form of narrow

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strips of crystalline lime, graphite, and serpetine, running N -- S. In the granitic highlands peculiar pillow- and bag-shaped granite blocks form partly the peaks of the knolls ("pulpit mountains") and partly they cover the latter and their slopes with something like a continuous blanket ("rubble drifts" and "block talus"); partly they are so to speak sprinkled along the valley slopes and valley bottoms. High moors are imbedded in this "bowlder landscape."

The rivers of the granitic highlands generally run from N to S in pairs. The main watershed between the Danube and the Elbe, which forms part of the Central European watershed, runs through granite all the way without however climbing to extraordinary heights. In their upper course the rivers run through flat depressions and small valley basins; in their lower course they cut the S edge of the highlands into deep, trough-like valleys and even gorges.

In the gneiss highlands the rivers run from W to E with the exception of the upper course of the Thaya River; the Krems and Kamp rivers turn sharply SE; their upper course likewise runs through flat depressions. In the E however they form deep, winding valleys from whose forested, step-like slopes rise rock groups. The many shorter and longer tributary brooks run into the highlands in narrow troughs.

In the far eastern part we can discern a distinct line (Krems -- Eggenburg -- Retz -- Znaim) formed by granite found in the highlands as well as in small, prepositioned buttes. This rim area has been named the Manhartsberg Range after its highest point. Mt. Manhartsberg (536 m). E of Zoebing there is a small block of reddish sandstone from Permian times.

The Danube Valley does not form the distinct southern border of the Bohemian Massif all along the line; in deep, winding valleys the Danube

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cuts off certain parts of the highlands, e. g., the plateau of Sau Forest (876 m), Kuernberg Forest (524 m), the plateau of Neustadtl (596 m), Mt. Hiesberg (553 m), and Dunkelstein Forest (712 m).

The Bohemian Massif is considered a remnant, a trunk, of the Central European basal complex of the Carbonaceous which was cut up by faults and depressions. This complex was cut away as early as during Permian times. In the E one can recognize an overfault of the rim zone (Moravian rim zone) which continues into Moravia; this overfault was caused by the older basal complex (Moldanubian basal complex) situated between the Moldau and Danube rivers. The overfault line is in no way indicated by the surface configuration. During the Triassic and Jurassic the Bohemian Massif was a continent which, it is assumed, extended close to the present-day Wechsel area; the deposits of the chalk sea, which we find in Bohemia, are absent in this section.

The eastern and southern parts of this continent began to drop during the Tertiary. As a result of the northwestward movement of the Alpine folding, one piece after another of the Bohemian Massif was pressed into the depths in the S and SE and covered by Tertiary deposits (molasse). Drillings in the following places revealed bedrock: Wels, at 1,036 m and 1,240 m; SE of Haag at 630 m; NW of Neulengbach at 740m; Mossbierbaum at 91 m; Absdorf at 404 m. E of the line Absdorf -- Hollabrunn -- Mailberg the bedrock is assumed to be at depths of 3,000 m. At the same time broad steps and small depressions and basins were formed in the interior as a result of step faults; the Feldaist Gap, the Gmuend Gap, the Gallneukirchen Basin, and the Horn Basin seem to have developed in this manner; only the two last-named were penetrated by the Tertiary sea which surrounded the edge of the plucked Bohemian Massif; in the E and S its deposits extended to points as high as 500 m along today's elevations; the Gmuend Gap was the bay of a sweet-water lake which filled southern Bohemia during the Oligocene.

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THE DANUBE LANDSCAPE TYPES

Of Austria's far west more than 2,300 sq km are drained by the Rhine; of the NW corner almost 2,000 sq km are drained to the Moldau and Elbe; the rest of Austria belongs to the Danube River system.

Of the Danube's total length of 2,860 km, a 350-km stretch is situated on Austrian territory. This stretch begins along the right bank 2 1/2 km below the mouth of the Inn River at Passau (river kilometer marker No 2,223) and ends 11 km below Hainburg (river kilometer marker No 1,873). The left bank is on Austrian soil from river kilometer marker No 2,202 to marker No 1,881 (March River mouth).

Due to its position and direction, the Danube runs through all of Austria's major landscapes. The Danube is Austria's chief river because almost all waters drain into it and because the Danube Valley has been a main traffic artery since olden times. It was of great significance to Austria's development. Because of the Danube, which runs on its soil, Austria is considered one of the Danubian countries.

Due to the frequent alternation of narrow and wide sections, we can distinguish the following valley landscapes in Austria (Table 2).

1. The Passau Valley is the breakthrough point of Danube through the gneiss and granite masses between the Inn River junction and the Aschach River. The river here cuts the Sau Forest (= Passau Forest, 876 m) off from the Bohemian Massif. In the W the valley is straight; in the E (granite) it is heavily curved.

2. The Eferding Basin between Aschach and Ottensheim, named after the city of Eferding in the SW, is also a flatland rich in floodplain meadows and fields in which the Danube and its two branches curve to the right; in the S it borders on the Alpine Foreland.

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3. The Linz Gap between Ottensheim and Linz is cut into the gneiss surface which here accompanies the granitic highlands of the Muehlviertel area; this separates the Kuernberg Forest (524 m) from the latter.

4. The Linz Basin -- from Linz to Ardagger -- is bordered in the N by the steep tail of the granite highlands and in the S by the terrace landscape of the Alpine Foreland.

The rivers coming from the N and S mostly run into old Danube branches. The northern part of the basin is called Machland; the flood-plain meadow belt is accompanied by a heavily settled field zone.

5. In the Strudengau section -- between Ardagger and Ybbs -- the Danube cuts off a part of the granitic and gneiss highlands of the Muehlviertel and Waldiertel areas. The valley slopes here and ther have steps; on one of these stands the citadel of the city of Grein. The whirlpool (Struden) was downstream (Figure 4). Prior to running into the Danube, the brooks form deep gorges (Stillenstein Gorge near Struden).

The rock reefs in the river bed, the whirlpools caused by the narrows, and the great speed of the river for a long time constituted dreaded shipping hazards. These points were called Schwall [Swell], the Strudel whirlpool above Struden where Woerth Island narrows the river bed which was studded with rock reefs called "Gehaechle" or choppy point, and the Wirbel section. The Danube branch S of the island, called Hoessgang, was passable for streamers at high-water time until 1910; today it is filled with gravel. The Wirbel section, where the water forms an eddy 15 m in diameter and 1.5 m deep, was caused by a higher rock island (Hausstein) which, like the rock on the opposite bank (left bank), called Werfenstein, carried fortifications. A navigation channel was blasted as

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early as in 1777 and 1791; between 1853 and 1866 the Hausstein rock was dynamited and a protective dam was made out of its rubble on the left bank. Further projects deepened and widened the channel to 80 m; in 1890 the Grein Swell was removed. After completion of the Danube power plant at Persenbeug, full navigation will be possible here.

6. The Nibelungengau section between Ybbs and Melk is accompanied in the N by the gneiss plateau of the Waldviertel area, which is heavily cut by rivers; in the S it is accompanied in a few places by the Alpine Foreland.

Between the Ybbs, Erlauf, and Melk rivers, which join from the S, a few gneiss heights form cut-off parts of the Waldviertel area; of these, Mt. Hiesberg (553 m), situated S of Melk, is the highest and most massive.

This section of the Danube received its name from the Nibelungenlied [Song of the Nibelungs], in which the villages of Poechlarn and Melk are mentioned.

7. The Wachau section (Melk to Krems) is a breakthrough valley which cuts into the SE end of the Waldviertel area. The unusual depth of this part of the valley seems to have been caused by a subsequent uplifting of the rim areas of the Bohemian Massif.

8. The Tulln Basin (Tulln Plain) is the oval bulge in the valley between Krems and Greifenstein. It includes the alluvial land on both sides of the stream and the adjoining gravel soil of the low-lying terrace. In the N the latter ends along an old, steep bank called "Wagram" ("Wogenrain"). The diluvial terraces lying above it continue into the Tertiary hill country of the Weinviertel area. In the S a distinct borderline separates the alluvial plain from the hill country and the mountains.

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River control projects resulted in a safe navigation channel amid the approximately 5 km wide belt of floodplain meadows with its many oxbows, islands, and gravel piles. The lower course of the northern tributaries seems to be curving rather far toward E because the rivers run into the old Danube branches.

9. The Vienna Gap is that part of the Danube Valley which lies between the end of the Vienna Woods on the right bank and their continuation on the left bank, the so-called Rohrwald Range and the Bisamberg Range. Between the latter lies the depression of the "Korneuburg Bay."

Kreuzenstein Castle and Greifenstein Castle, the church on Mt. Leopoldsberg, as well as Mt. Bisamberg represent the cornerposts of the Vienna Gap.

10. The March Plain was named after the March River although it is an alluvial plain of the Danube. The river today flows along the southern edge; the right bank is accompanied by an escarpment. On the left bank we then find fertile land which in the N extends to an approximately 10 m high step which however is no longer preserved in its entirety (Gerasdorf -- Markgrafneusiedel -- Marchegg). The adjoining high terrace land with its occasional loess cover and its not very fertile gravel and sand soil here and there reveals a rather sparse heath.

11. The Hungarian Gap is characterized by the granite mountains of the Little Carpathians (Mt. Thebner Kogel, 514 m) on the left bank and a severed part of that range, the Hainburger or Hundsheimer Mountains (476 m) on the right bank.

The mountains consist of granite, gneiss, and slate; on their W side they are accompanied by a narrow strip of Triassic limestone (large quarries).

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The gap at one time constituted the bed of the March River, while the Danube at that time flowed through the Brucker Gap. The sulfur springs at Deutsch-Altenburg indicate the great N -- S fault line which crosses the Danube here.

The Danube landscapes reveal three characteristic features: the alternation of valley narrows and wide sections, the curving of the river toward the right, and the terracing of the valley slopes. These phenomena can be explained on the basis of the geologic development of the Danube.

In the Middle Miocene the ocean cover of the present-day Alpine Foreland disappeared. The still sinking foreland was filled with gravel masses from the Alps; these masses also covered a part of the outer rim of the Bohemian Massif. On top of all this, a forerunner of the Danube collected the waters coming from N and S and then ran off toward E because the foreland continued to sink in that direction until the end of the Old Pliocene, thus creating the erosion base of the stream. The powerful water body cut into the deposits and into the underlying rock of the partly uplifted rim areas. It removed huge masses of pebbles, rubble, sand, and mud and thus filled the eastern depression fields. Whenever the depth erosion stopped, there would be a strong side erosion or a filling and widening of the river bed. During the next sinking process of the eastern parts, the deepening of the river bed began again along the direction of the river's course, running through gravel masses and in the rim areas of the Bohemian Massif. The river bottom therefore consists of rock in the narrow parts and of Young or Old Tertiary or ice age sand and gravel in the wide parts. In the narrow parts there are few terraces, while in the wide parts they are present in many varied forms.

There is no uniform theory on the origin of the Danube Valley.

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It seems that old breaks and the clash of disturbances and canyons gravitated toward the deeper positioning of the river. The present-day Danube Valley is probably composed of different sections which originated at different times and which "were welded into one unit as late as during the ice age, after the running water had stopped 'wandering around aimlessly' in other valleys" (Waldmann).

Observations revealed that the stream has a tendency to move its bed toward the right; this has been ascribed to the effect of the rotation of the earth. The force of the tributaries, earth crust movements, and even the wind may also have had a hand in this. The fact is that the Danube in its wide sections curves toward the right. Looking at the map, the geologist E. Suess spoke of "points at which the river sort of gets hung up" and of the "garlanded course" of the Danube.

A glance at the map shows that the water volume of the river depends mainly on the Alpine tributaries. The glacial waters run into the Danube from more than 100 Alpine glaciers. This and the river's gradient as well as sudden floods and voluminous pebble movements make the Danube entirely a mountain stream in Austria.

THE CLIMATE

Austria's climate is determined by the country's position in Central Europe; it is influenced by the oceanic climate of the West, the continental climate of the East, and the climate of the Mediterranean area; elevation above sea level and terrain configuration are also important.

On the whole, Austria's climate is a transition climate which reveals the characteristic features of the western and eastern climates in a milder form. The influence of the Mediterranean area is comparatively minor; it is confined to the southernmost areas.

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The daily weather reports of the Central Institute of Meteorology and Geodynamics clearly reveal the decisive climate-forming factors issuing from the major climate areas.

(Official weather report, 7 November 1951. "Center of strong low-pressure area in Bay of Biscay. Between this Low and the Russian High, the southward stream has become stronger over Central Europe; this resulted in foehn in the North Alps. While fog and high fog appeared in the depressions of southern and eastern Austria, the weather in the North Alps this morning was clear and moderately cloudy. The morning temperatures in the S and E varied between 3° and 7°; in the foehn valleys of the North Alps they were as high as 15°. Weather forecast for 8 November 1951: high fog in Danube area and eastern rim of the Alps, SE wind, otherwise varying increased cloudiness, light temperature rise; Tirol and Vorarlberg: strengthening of foehn position, clear or moderately cloudy, maximum temperature over 15° due to foehn; Salzburg and Upper Austria: variable cloudiness and locally loose cloud cover due to foehn; Central Alps: light precipitation; foehn area: very mild during the day; Carinthia and Styria: mostly covered with precipitation, especially in Central Alps section; little change in temperature.")

Considerable differences may be encountered in the several major and minor landscape types. These are caused by the particular location of a place which is determined by elevation above sea level, valley or slope position ("sunny or shaded side"), position in the mountains, soil, nearby major water bodies, etc.

The variations in the weather are caused by the quantity of heat delivered by direct sun rays and to a small extent by scattered sun rays (sky radiation). The actual radiation depends on the duration of sunshine; the latter in turn depends on the location of the place -- in valleys the effect on the sun may be curtailed severely -- and on the cloud cover.

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Observations have disclosed that the duration of sunshine (little or no cloud cover) in general increases strongly with elevation from October to February; this means that during the winter months the lower-situated places have little sunshine, while the higher places, especially those over 2,500 m, receive their annual maximum sunshine during that period. On the other hand the higher places get less sunshine than the lower places during the summer months. (The average duration of sunshine in Vienna during June and July amounts to about 8 hours a day; on Mt. Sonnblick it is 4 hours. The annual average duration of sunshine in Vienna amounts to 1,838 hours, in Zuerich to 1,760 hours, in Davos to 1,814 hours. In favorably situated mountain areas we find sanatoriums. The Stolzalpe Health Resort (1,100 to 1,300 m) gets an average of more than 1,900 hours of sunshine.) During the spring months the number of clear days in the lower and higher places is about even; the cloud cover above areas higher than 2,500 m is heaviest especially during April and May.

Considering Austria's small latitudinal coverage, the terrain elevations are especially important to the temperature conditions. In general there is a 0.5° drop in temperature for each 100 m of ascending elevation; depending on the time of the year and the terrain configuration, this difference may be greater or smaller. Local temperature conditions are greatly influenced by terrain configuration.

In wintertime, when the weather is nice and when there is no wind (high), the soil of basins, hollows, and valleys is strongly cooled by radiation. The cold air is collected in the lower areas due to its greater weight and forms cold air lakes. The air drops from above and it gets warmer by 1° for every 100 m of descent. Thus we have a temperature inversion which causes the temperature in the lower places to be cooler than in the higher places. (A Carinthian proverb says: If you climb one flight in wintertime, you need one coat less.) The normal temperature sequence returns at about 1,200 m above sea level.

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This phenomenon is especially noticeable in the Klagenfurt Basin, in the Lungau area, in the Puster Valley, in the longitudinal valleys of the Salzach and Enns rivers, and in the Aflenz Basin, to name just a few places. (In view of the effect of local climatic factors on agriculture and forestry, special studies have been made recently of the temperature extremes and inversions in certain areas. A temperature of minus 24.3° was recorded at the base of a dolina in the Mt. Duerrenstein Massif near Lunz, Lower Austria ("Gstettner Alm"), at an elevation of 1,270 m; at the same time the temperature on the open plateau at an elevation of 1,560 m was plus 6.2°. At the dolina bottom the temperature at times dropped to minus 50° which is the lowest temperature recorded in Austria so far.) Cold-air lakes threaten agriculture with late and early frost. In the summer however these landscape sections have higher temperatures than their surroundings.

The average temperature during the vegetation period -- the major vegetation months are May, June, and July -- remains below 15° in the Muehlviertel and Waldviertel areas and below 12° in the highest places.

In the following Alpine sections the average temperature does not drop below 15° during the vegetation period: the Rhine and Ill River valleys up to Bludenz, the Inn Valley from Hall to the Oetz Valley junction; the Salzach Valley up to Werfen, the Gail Valley up to Koetschach, the Drau Valley up to Lienz, the Mur Valley beyond Leoben, the Muerz Valley up to Muerzzuschlag, and the Traun Valley up to Ischl.

In the following areas the average temperature does not drop below 16° during the vegetation period: the Klagenfurt Basin, the Rhine depression from Dornbirn to Lake Constance, southeastern Styria, the Alpine Foreland between the Traun and Enns rivers, the lower Inn Valley, and the Danube Basin at Linz.

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The following areas, in which the average temperature does not drop below 17° during the vegetation period, are Austria's warmest: the rim landscapes in the E, the "warm-weather islands" at the foot of the Mt. Manhartsberg Range, the Laaer Plain, the Weinviertel area and the March Plain, the E side of the Thermen Alps, the Leitha Mountains, and the Styrian-Burgenland hill country.

The drop in temperature with increasing elevation is expressed in the landscape by the end of the forest growth above the tree line and the appearance of "permanent snow" above the snow line.

West winds prevail in Austria's northern extra-Alpine area and NW and N winds prevail along the eastern edge of the Alps. Wind also comes from SE and E, especially in the winter. In the Alps the terrain configuration causes the general westward current in the lower sections to be displaced by local wind systems.

In the longer valleys we note mountain and valley winds.

Air currents develop which during the day blow up the valley and at night down the valley; they are popularly called "upper wind" and "lower wind" and occur chiefly during nice weather. Their disappearance indicates a change in the weather.

The fall wind is of great significance. The foehn is a form of fall wind in the Austrian Alps.

It takes a low, passing north of the Alps, to bring about a foehn. The low sucks the air masses out of the valleys N of the main ridge of the Alps so that air masses are soon moving across the latter from the southern areas. The weather is bad S of the Alps as a result of relief rain. A cloud wall, the "foehn wall," penetrates up to the very ridge of

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the Alps and then dissolves (Figure 16). The air masses coming from the S drop into the valleys with great force and get warmer at the rate of 1° for every 100 m. In the main valley they arrive in the form of warm and dry storms (see Note) or winds and they are noticeable far to the N (Table 3). The arrival of bad weather usually brings the end of the foehn. The latter may arrive at any season.

([Note] Newspaper item. "Innsbruck, 12 November 1951. An uncommonly strong foehn storm caused considerable damage in Innsbruck. Windows were broken and roofs were damaged. A poplar tree fell on a high-tension wire, cutting all electricity off in the borough of Muehlau. A scaffold attached to a church fell on the latter's roof...")

In the northern part of the Tauern Mountains the foehn is called "Tauern wind" and in the northern part of the Karawanken Range it is called "Jauk." In the spring the foehn accelerates the melting of the snow and in the fall it speeds up the harvest; it also lengthens the frost-free period. In some areas it permits the growing of plants which other wise could not ripen there, e.g., maize. The effect of the foehn is particularly evident in the Inn Valley.

Minor forms of fall winds appear along the sides of the rim mountains which face away from the main wind direction, e.g., on the E side of the Mt. Manhartsberg Range, in the Vienna Basin, along the eastern slope of the Leitha Mountains, in the Tulln Plain, and in the March Plain; in the case of easterly winds. These wind forms contribute heavily to the drying of the adjacent areas and call for certain protective measures; one of these would be the planting of forest belts.

Precipitation in Austria is characterized by a decreasing rate going from W to E and by its increase with increasing elevation ("relief rain"); the outer rim of the mountains, in the N, W, and S, receives

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more precipitation than the interior Alpine valleys.

In the North Alps and in the Danube area most precipitation occurs in July; a minor maximum occurs also in December. In the eastern part of the South Alps the month of July reveals the maximum precipitation; in East Tirol and in the Moell River drainage basin it rains most heavily during August and just a little less than that in October; in the Gail Valley and in the upper Drau Valley maximum precipitation occurs in October. In these two areas the voluminous autumn precipitation of the Adriatic area makes itself felt.

Local precipitation is strongly influenced by the direction of the mountain ridges.

The northern Limestone Alps and the highest parts of the Hohe Tauern Mountains get the most precipitation, i.e., 2,000 to 2,500 mm. In some parts of the Central Alps and the South Alps the precipitation volume drops to 1,000 mm (see Note) and it amounts to 2,000 mm in the Karawanken Range and in the Carnic Alps.

([Note] Until now it has been assumed that precipitation increases up to elevations slightly above 2,000 m and that it decreases again at higher elevations. In his article "On the Problem of Ice Volume and Precipitation in the Alps," Mitteilg. der Wiener Geogr. Ges. [Bulletin of the Vienna Geographic Society], 1948, the meteorologist Hanns Tollner arrives at the conclusion that "... the generally accepted view as to the relatively very small precipitation in the Central Alpine ridge area is not justified." He blames the small number of observation stations for the acceptance of this view.)

Since most precipitation falls along the edges of the mountains due to the latters' damming effect, we find that, as we go up the valley,

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precipitation decreases despite increasing elevation in most Alpine valleys which extend into the Alpine Foreland (Inn Valley: Kufstein, 503 m above sea level, 1,500 mm precipitation and Nauders, 1,362 m above sea level, 618 mm precipitation; Salzach Valley: Salzburg, 420 m elevation, 1,379 mm precipitation and Krimml, 1,050 m, 1,074 mm; Mur Valley; Radkersburg, 206 m, 948 mm and Tamsweg, 1,003 m, 695 mm).

Areas with little precipitation and an average of less than 600 mm are the northeastern parts of the Waldviertel and Weinviertel areas where only the buttes get more than 600 mm, the March Plain, the northern part of the Vienna Bay, and the areas SE of Lake Neusiedel. In the center of the March Plain and in the lakes area of Burgenland the annual mean is less than 500 mm.

The annual snow cover plays a role in the economy by virtue of the protection it offers against the freezing of the soil and of the vegetation and because it slowly dampens the soil when the snow melts ("winter dampness"). It also considerably cools the air. Too much snow can cause heavy damage due to avalanches and floods.

The thickest snow cover is found during February at elevations from 1,200 m down, in March at elevations from 1,200 m to 1,700 m, in April over 1,700 m, and in May and June in the highest Alpine regions.

The Alps form a distinct weather divide which in the W coincides with the central chain; in the E it runs along both limestone chains in the winter and along the Niedere Tauern Mountains and the Eisenerzer Alps in the summer.

The weather divide often manifests itself in a surprising manner at the passes leading across the main ridge (Brenner, Katschberg, and Semmering passes). Several individual mountain ranges also act as

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weather divides to a smaller extent, especially when this effect is brought about by their elevation (Oetztaler Alps, Zillertaler Alps, Hohe Tauern Mountains) or by their peripheral position (Bregenz Forest, Vienna Woods, Mt. Wechsel Massif).

The Alpine Foreland has better weather than the Bohemian Massif; both have a beautiful autumn but the plateau of the Bohemian Massif has generally rough weather and the temperatures reach greater extremes than those in the Alps. The severe winter with its heavy snowfall often starts early after a beautiful autumn and the heavy snowstorms only make things worse. In the Carpathian Foreland, in the Vienna Basin, and along the edge of the Pannonian Plain the summer is usually hot and thunderstorms are frequent; the autumn is cool and clear, and the winter is damp and foggy.

The characteristic features of the climate of an area are the time of arrival of the first green vegetation and the blooming of plants, the number of days with sunshine, and the number of days with frost.

PLANTS AND ANIMALS IN THE LANDSCAPE

The landscape picture is determined by the natural and by the manmade plant cover. The manmade economy changes the natural landscape into a cultivated landscape.

The forests with their tree varieties, size, and distribution play a great role in the overall landscape picture. The Central European vegetation cover prevails in the Alpine forests. Deciduous forests, whose most important tree is the beech tree, generally grow below 1,000 m elevation above sea level; the spruce is in the majority of the coniferous forests while the fir tree is rather in the minority. The highest-situated forest trees are the larch and the cembra pine; the latter are

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not found at elevations lower than 1,000 m and penetrate up to the glaciers; in some high mountain valleys they form large forests; their formerly vast extent is proved by a number of place names (Mt. Zirbitzkogel, Mt. Zirmjoch, Lake Zirm). The red pine (pine) favors the dolomite and gravel soil and the rock slides; it grows at elevations of up to 1,350 m. The black pine (Austrian pine) is the characteristic tree of the E end of the Lower Austria Limestone Alps and reaches into the Vienna Basin. It belongs to the Pannonian flora. This flora province is also characterized by the oak (brush) forests found in the Styrian-Burgenland hill country and in the Lower Austrian hills. Other characteristic plants of the Pannonian flora are also found in the bush forests (dwarf cherry, grape-pear, feather grass).

Stands of chestnut trees are found along the eastern edge of the Rosalien Mountains; entire groves are found in central and southern Styria. The northern limit of the chestnut tree almost coincides with the northern viniculture limit.

The upper timber line does not follow the contour lines; it has been established at 750 m below the snow line and it was found to be determined by a July temperature of at least 10.6°.

The altitude of the timber line is also influenced by certain local factors. Its particular position and exposure in a certain mountain range also plays a role. The wind is also very important in this respect since it works against the tree growth; rock types along the slopes are of importance likewise; finally we have manmade changes in the form of forest clearings designed to make room for pastures; this too forces the timberr line down to lower elevations.

The Stubaier Alps' timber line on their S side is at 1,840 m, on their W side at 1,970 m, on their N side at 1,800 m, and on their E side

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at 1,810 m; the Mt. Schneeberg timber line is at 1,680 m on its S side and at 1,540 m on its N side (Table 1).

The forest zone frequently makes its transition into the alpine zone in the form of a 100 to 150 m wide and rather loose tree belt; in the so-called "battle zone" we find the tousled and broken "weather spruce" which in the battle against wind and weather forms the foremost outpost of the forest (tree line); adjacent to the forest zone one can also find a belt of mountain pine (called dwarf fir, "Arle," and tinder) which covers large areas especially in the limestone mountains between 1,500 and 2,000 m elevation and extends down to 500 m elevation in the canyons. In the crystalline mountains we find intermingled the so-called "Gruenerle" bush (called Drus and Drosla), as well as the mountain willow.

Then we have the Alpine rose bushes, which vary as to type in the limestone mountains (fuzzy Alpine rose) and in the crystalline mountains (rust-colored Alpine rose).

The grass of the pastures reveals several short-stemmed plant forms. Fens and lichens cover the rocks. In crags exposed to sunshine we find Edelweiss and Artemisia; on the glacial moraines, at an elevation of 3,300 m, we find the herbaceous pasture and dwarf juniper; even the glacier ice is often colored blood-red by a type of alga.

The forest area of the Bohemian Massif forms the higher part of the Muehlviertel area and of the Waldviertel area; in the border area toward Bohemia it forms large, continuous areas which cover up to 80% of the surface. It is interrupted only by old clearings which increase in number and surface area in the E, especially in the gneiss zone; as a result the

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forest in that section is divided into small patches ("Schachen"); it grows on the slopes of the main valleys in compact units and in places penetrates into the plateau in the form of loops.

Here too the coniferous forest prevails; it is represented chiefly by the spruce and, on dry soil, by the pine; in some parts large stands of beech trees and birch woods were planted.

In the high moors we find the red pine and the swamp pine as well as the birch tree; the dwarf birch is a remnant of the ice age flora.

While this region belongs entirely to the Baltic flora, we find that the Pannonian flora predominates in Austria's NE, in Lower Austria's "Weinviertel" area.

The forest forms major, continuous areas only in the gravel hill country in the center; otherwise there are only small stands. The forest consists almost exclusively of oaks between which there is dense underbrush (hazel tree, dogwood, etc) (oak bush forest); in addition we also find pine forests (red pine). Stands of other forest trees are the results of forest cultivation. Another characteristic feature is represented by the small stands of locust trees (erroneously called acacia) which border especially on the loess gorges; this tree type was introduced into Austria in the seventeenth century. In the March Plain and in the Vienna Bay, oaks, pines, birch trees, elm trees, and locust trees were planted to check drifting sand and to improve the soil.

The floodplain forests hold a special position in the landscape picture; they cover the river deposits and are especially widespread in the Danube plains.

They consist of alders, willows, black and silver poplars, and dense underbrush in which we find chiefly the clematis.

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The fields are of greater significance to the landscape by virtue of their cultivated plants and the manner of their distribution (fields and plains) than are the forests by virtue of their tree types. Like the forests, the fields have an upper limit called the cereal line; in the Alps the grain growing area does not reach higher than an average of 1,550 m elevation if we speak of the line up to which grain is harvested and not merely used as animal fodder.

Since the grassland accompanies the brooks and rivers in the form of meadows, it is mostly found in the landscape of the valley plains; only in some areas, as for instance in the Slate Alps and the Flysch Alps, do we find meadows on the slopes of mountains where, bordered all around by living brush (groves), they give the landscape its unique character.

Viniculture gives the landscape a very characteristic appearance; the terracing of vineyards often produces changes in the terrain configuration; viniculture is limited to warm and dry summer climates and is therefore encountered only in the SE and NE of the Alpine rimland and its foreland as well as the Carpathian Foreland; there it spreads out along the peripheral hills and buttes up to an elevation of 350 to 400 m; only in rare cases does it spread into the adjoining plains.

Fruit growing is significant in the landscape only if it covers large areas in addition to the kitchen gardens; this applies to the Styrian hills, the Alpine Foreland (cider), and in wine country as well as in some Alpine valleys with favorable climate.

The animal world, which is entirely of the European kind, does not stand out in the landscape. Nevertheless certain species of animals are connected with certain landscape types.

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In the high alpine regions we find the chamois and the marmot, the snow hare, the snow grouse, the white grouse, the Alpine jackdaw, and the snow mouse. The capricorn was at one time introduced in the Karawanken Range and the marmot was brought to Mt. Rax.

In the area of the Pannonian flora the vast mobs of wild rabbits and ground squirrels damage cultivated plants. Here we also find the large bustard and the white stork.

On the Danube floodplain meadows we find the stag on free hunting grounds; it also lives in the Alps and some parts of the Bohemian Massif; fallow deer, wild sheep (mouflon), and wild boars are mostly found in the zoos.

On the Danube floodplain meadows we also find vast numbers of wild geese and ducks; here and there we encounter herons and cormorants; spoonbills and avocets also build their nests on Lake Neusiedel whose wide reed border harbors rich bird life.

Particularly scenic areas or sections in which flora and fauna appear in their original forms, as well as animals and plants whose existence is threatened, and certain natural formations which have a peculiar shape or are of scientific value -- all these can be protected by law in order to save them from destruction.

The official protection of natural features is the responsibility of the Austrian federal states which take the necessary legal measures through their state park authorities.

For landscape protection there are for instance regulations against the contamination and building up of lake shores and river banks and provisions for the erection of signs. Certain sections may be declared natural monuments; any sort of commercial activity is prohibited there.

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Examples of such protected areas are the Felber Valley in the Hohe Tauern Mountains, the Pasterze Glacier and the Gamsgrube section in the Mt. Glockner area, as well as some sections E of Lake Neusiedel. Certain plants, such as Edelweiss and bugle, and animal which may not be hunted, such as many kinds of birds, are protected throughout Austria. Since the kind and number of plants and animals found in the federal states varies, there are certain variations in the state park laws. At this time there are about 40 state parks and 1,500 natural monuments in Austria.

The teacher is a chosen protagonist of the idea of natural parks; in this manner he not only performs an important educational function but he also serves nature and the people.

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SETTLEMENTS IN THE LANDSCAPE

(see pertinent maps in atlases)

The characteristic features of all farm settlements (compounds) are determined by the type of farm house, the type of settlement, and the type of field.

(a) Types of Farm Houses

The farm house type is determined by the position of and structural connections between the component parts of the farm building complex: living quarters, stable, barn, and shed. The adaptation to the terrain and the type of farming as well as the use of local building materials (stone and wood) constitute geographic factors to which we must add the effects of settlement history.

There are two main farm house types in Austria.

1. The single-unit farm house, called "Einhaus," combines all structural components in one building unit under one roof.

2. The group farmstead consists of living quarters and farm buildings which are not combined in one building unit. The group farmstead may be laid out in a regular linear, L-shaped, three-sided, four-sided, or square) or irregular pattern. In the case of the irregular group farmstead, also called scattered or bunched compound, the living quarters are separate from the fodder and stable unit (paired compound) or the living quarters, stable, barn, and shed are irregularly positioned around a central farm yard.

Figure 5, Item 7, shows the Upper Austrian and Salzburg single-unit farm house which is typical in the Alpine fringe area W of the Traun River. The living quarters and all other farm buildings are under one roof with a straight ridge. Between the dwelling unit and the stable part we find the connecting central room, called

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the threshing floor ("Mittertennhaus" [house with centrally located threshing floor]).

Around Lofer, in North Tirol, and in Upper Bavaria the Tirolian-Upper Bavarian single-unit house prevails (Figure 5, Item 8). In this type the living quarters follow immediately after the stable part.

In the central Tirol single-unit house (Figure 5, Item 9) the threshing floor again holds a central position; the door of the threshing floor however faces toward the gable. A door leads into a corridor which is separated from the threshing floor; from this corridor one can enter the rooms of the living quarters.

In the Bregenz Forest house (Figure 5, Item 10) we can detect Alemannic features; we find large, closely-spaced windows, small rooflets over the windows, and outside walls covered with small shingles; on the eaves side, the small rooflets are under a roof which juts out.

In the hill country below Mt. Manhartsberg, in the Alpine Foreland approximately E of the Pielach River, in the Vienna Basin, and in northern Burgenland the living quarters and farm buildings are setup either in single file, one behind the other, in which they are called longitudinal farm house complexes, or they are L-shaped, in which case they are called L-shaped farm building complexes; they may also surround the farm yard on three sides, with the fourth side being closed by a wall with a gate in it -- called the three-sided farmstead -- or by a building, in which case it is called a four-sided farmstead (Figure 5, items 21 and 22). In compact settlements one farm complex is built right next to the other; these are then called continuous farmsteads. Buildings on narrow plots face with their gables toward the street. The house itself can be entered via the farm yard.

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In the cleared areas of the Waldviertel and Muehlviertel areas the farmstead types are rather irregular. The chief type consists of an often longitudinal farm yard surrounded by three buildings; its open side is closed by a wall with a gate in it. The buildings are adjoining to each other, sort of grown into each other, and they are at right angles to each other. For this reason we speak of a "three-cornered" farmstead (Figure 5, items 19 and 20). In the Muehlviertel area a building is erected along the wall, making a four-cornered farmstead out of a three-cornered one.

The Alpine Foreland between the Traun and Pielach rivers is the main area for the four-cornered farmstead (Figure 5, Item 15). This is the most complete and largest form of the ring-type farmstead (a building complex surrounding the farm yard). It has extensive stables and storage rooms. The completion of this form in the main area of its distribution was attained 150 to 200 years ago. The imposing farmsteads mostly take the form of individual building complexes amid the surrounding fields.

The east Styrian four-cornered farm compound (Figure 5, Item 14) clearly reveals the original independent position of the farm buildings.

The paired compound is a kind of irregular group compound. In upper Styria, in the Lungau area, and in Carinthia we find the eastern Alpine form of the paired compound (Figure 5, Item 2). The combined fodder and stable building is considerably larger than the building containing the living quarters and the smokehouse (animal husbandry) and the roof is steep.

The interior Alpine paired compound (Figure 5, Item 3), which is found in Salzburg and Tirol, differs from the above forms only by virtue of the shape of the house (flat roof with shingles).

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The smokehouse of the South Tirolian paired compound (Figure 5, Item 4) has an Alpine form; the fodderhouse has a scaffold-type construction with a very steep thatched roof.

The western Alpine paired compound (W of Mt. Arlberg, Figure 5, Item 5) has houses which reveal Alpine as well as Alemannic characteristics.

In upper Tirol, in the Walgau and Montafon valley sections, there are many closely built-up villages with Alpine composite compounds (cf. Figure 5, Item 6). The houses often belong to several families which share a common kitchen. The stables are also shared.

Another type of irregular group compound is the interior Austrian bunched compound (Figure 5, Item 1). Here the dwelling house stands alone; it never contains the stables under the same roof. In the case of old bunched compounds the stable, barn, and auxiliary buildings are scattered over the compound area (scattered farmstead). In the course of time the buildings were moved together. Large combined stable and barn buildings sprang up. In the Eisenwurzen area the stable-barn is often erected crosswise to the dwelling house; this results in peculiar buildings in the form of a "T", a "TT," and an "H." The scattered compound is one of the original farmstead forms.

The Carinthian ring compound, also called "Karantanischer Haufenhof"[Carantanian bunched compound], shown in Figure 5, Item 13, reveals a characteristic area for the maintenance of animals, surrounded by stables and fodder huts.

The four-sided compound of the Innviertel area (Figure 5, Item 17) is found in the Alpine Foreland from the lower Inn River up to

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the Hausruck area. The buildings surrounding the yard are not connected.

The Hausruck farmstead (Figure 5, Item 16) is found in the Hausruck area W of the Traun River. It is a semi-four-sided compound, i.e., the buildings do not form a complete ring. One side of the dwelling house usually does not adjoin any other building.

(b) Types of Settlements

The position of a settlement in the landscape and its original layout are determined by geologic, morphologic, and climatic conditions. Settlement development is also influenced by the economy, by transportation facilities, and by history.

There are two types of settlements: (1) the scattered settlement; (2) the compact settlement.

The scattered settlement consists of individual farm compounds which lie scattered throughout the terrain.

The individual farm compound is above all a characteristic feature of the Alpine landscape. It is rarely to be found on the valley bottom; more often it is encountered on the alluvial cones of brooks and very often it is found on valley ledges; on the sunny side of the valleys one can even find it at considerable elevations, e.g., at 1,400 m in the Lungau area.

The individual farm compound is also encountered outside the Alpine area, e.g., in the Muehlviertel area, in the extreme southwestern corner of the Waldviertel area, and in eastern Styria. Two individual farm compounds located close to each other are called an "Einschichte" [twin farm setup].

Hamlets, villages, market communities, and towns belong to the compact type.

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A hamlet consists of between three and no more than nine farms located reasonably close together in an irregular pattern. A village consists of a larger number of farms.

The oldest form of village settlement would seem to be the bunched-type village in which the farms are arranged in groups between which traffic routes lead to an irregular village square. Here the farms are arranged without a definite plan by the first settlers. The roadside village however developed mostly on the basis of a definite plan along one or both sides of the village street. In many cases the village street was widened into a village commons in the center of the village. (This is called "Anger" in German, from the Old High German word "angar" meaning a grassy area.) The village-commons settlement is also frequently based on a definite plan.

The farmsteads are arranged around the village commons in a regular pattern. Behind the houses we have the gardens whose fences enclose the village. The traffic routes meet at the village commons exits. The village commons may have various forms, depending chiefly on the terrain. In many cases the church, originally intended for several settlements, influenced the origin and development of the village (church settlement).

The village-type settlement predominates in the Waldviertel area, in the hill country below Mt. Manhartsberg, in the Vienna Basin, in Burgenland, and in eastern and southern Styria.

If an old settlement gradually acquired the rights of a market community or a town, we speak of a created market community or a created town (e.g., Vienna, Krems, St. Poelten, Salzburg).

In some market communities and towns one can distinguish several settlement types dating back to various periods. These are

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called "grown" market communities and "grown" towns (e.g., Innsbruck, Linz, St. Poelten). Market communities and towns endowed with market and municipal rights at the time of their founding (twelfth to fourteenth centuries) are called founded market communities and founded towns (e.g., Feldkirch, Klagenfurt, Radstadt, Bruck on the Mur River, Leoben, Enns, Korneuburg, Wiener Neustadt). In some cases the walls have helped preserve the peculiar character of the towns to this very day.

In the case of founded towns one can recognize the original layout despite subsequent expansion (rectangular town squares and a grid-shaped street network, e. g., in Kufstein, Radstadt, Friesach, Leoben, Linz, Retz, Rust). In other towns the square is only a widened section of the main street.

Village settlements developed into market communities and towns particularly when they were located along a good transportation route and at the boundary between two different economic regions. Such market communities can be found for instance along the boundaries between the Alpine Foreland and the flysch zone, between the flysch zone and the Limestone Forealps, as well as along the edges of the basin landscapes (Wilhelmsburg, Kirchdorf on the Krems River; Kirchberg on the Pielach River, Weyer; Aschach on the Danube, Tamsweg, Althofen on the edge of the Krapp Plain).

Every settlement depends on the presence of drinking water. The original ground water situation therefore plays an important role in the choice of a settlement site. The settlements therefore tend to concentrate in spring depressions and along brooks and rivers.

They are distributed rather unevenly throughout the landscape. In the Alps they cluster together in the valleys and basins, while large areas are unsettled.

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The unsettled area in the Flysch Alps amounts to 30-39%, in the Fischbacher Alps and in the Wechsel area to 30%, in the Lavant-taler Alps to 37%, in the Gurktaler Alps to 56%, in the Hohe and Niedere Tauern mountains to 77%, and in the Limestone Alps to 79-83% of the total area of these mountain groups; even the south-east Styrian hill country contains as much as 12%, the Klagenfurt Basin 4% unsettled land.

In the hills and in the plains the settlements are distributed more evenly.

Sites on which settlements used to stand are called deserted [wilderness] settlement sites; often only a few local field names serve to recall the former settlement.

(c) Types of Fields

Farmed areas, called fields, reveal certain forms which are connected with the type of settlement; this is a codetermining factor in the appearance of the landscape.

The block field consists of irregular blocks of field surfaces of varying size; these blocks are subdivided into unequal plots which are polygonal, square, or rectangular. When several blocks belong to one settlement, each farm shares in the division of each block; in this manner the farms of a village community get more or less equiva-lent arable plots.

In the course of time, the size and shape of the component plots changed as a result of further subdivision or combination but the basic shape of the major blocks is still recognizable in the field.

In the Alps the block field is represented in almost every compact settlement. In the Danube area the block field is also found

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in connection with the oldest settlement type, the bunched village and those hamlets which originally belonged to one clan.

In the case of the "square plot" field the component major field parts form regular square and rectangular surfaces called "Gewann." In hilly country these field sections conform to the terrain configuration. The individual plots are divided into strips or belts forming long and narrow surfaces which originally were of equal width and extended along the entire length of the "square plot" areas.

The number of field strips corresponded to the number of farmsteads in the settlement. The length and width of the individual strips changed as farming activities progressed. The only thing that remained is the strip shape of the plot.

The "square plot" field is mostly found in conjunction with the planned roadside and village commons settlements. Its area of distribution coincides with the fertile plains and hills, especially in Lower Austria and Burgenland; it fills the lower valley sections of the east Styrian rivers and the basins S of Graz. In hill country and in areas where the quality of the soil varies, the number of "square plot" sections increases, while the plots grow smaller. This planned field form developed in the eleventh and twelfth centuries. Property splitting resulted in forms which adversely affected farming. In recent times the disadvantages of field splitting have been counteracted through plot consolidation.

In the case of the isolated field we find the individual farm compound surrounded by its block-shaped field. The settlement site and the farming area are combined into what is called a "bent field" [Ried] or a "subhamlet" [Rott]. Within the "bent field" boundaries

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lie the irregular cultivated plots, fields, meadows gardens, and woods. The isolated blocks form a wide-meshed network of individual farms.

The isolated field is characteristic of the scattered settlement. This field form is probably also to be found in the plain and in the hills; it is most widespread in the mountains because of its ready adaptability to any terrain. When it occurs in the form of a clearing, we can say that it developed between the year 1000 and the late Middle Ages and that it is to be found in the entire eastern Alpine area and in large parts of the Forealps in Upper and Lower Austria, as well as in the Muehlviertel and Waldviertel areas.

Between the main field types we find many intermediate forms and special forms· of these, let us mention the hide field [Waldhufenflur']. It consists of equally wide, long field strips which begin with the farm compound at the village street and run to the end of the settlement. The farm compound and its fields thus form an agricultural unit. The field strips are often up to 100 m wide and thus prevent the development of a compact settlement. The farm compounds are widely spaced along the village street which either runs along a brook in the valley or along the slopes and ridges (hide field village). The position of the hide conforms to the terrain configuration and is therefore often long-drawn-out and winding.

The hide field is found particularly in the border area between the Waldviertel and Muehlviertel areas and southern Bohemia.

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SECTION II. THE FEDERAL STATES

Vorarlberg

Area: 2,600 sq km; population: 193,000 (1934: 155,400); relative population density: 74 (Table 10).

I. Location (map exercise)

Neighboring states bordering on Vorarlberg; border running along watersheds. Where does the border leave the watershed? Measure the distances Piz Buin -- Bregenz, Arlberg -- Ill River mouth and compare these with equal distances to places near where your school is located. Sections of the Alps belonging to Vorarlberg. Geologic structure (cf. map in atlas).

II. State Sections

1. The Rhine Valley. Near Vaduz, in the hard limestone area, this valley is 3 km wide; toward its mouth, which lies in the flysch zone, it widens to 10-14 km. Like Lake Constance, it is mainly the result of the ice age and of river activity. The broad valley area and the Lake Constance basin however are the results of downfaulting. This is borne out by the protruding steep mountain ridges on both sides and by the island hills which consist of hard limestone; these hills are to be considered as horsts of the downfaulted limestone cover and are to be found in the N up to Goetzis. This trough-like downfaulting determined not only the drainage of the area but also the route of the advancing Rhine Valley glacier. The downfaulting also made the valley considerably deeper than the adjacent valleys. The latter break off toward the main valley in the form of steps (Figure 3). Before entering the plains, the rivers form canyons and gorges, e. g., the Bregenzer Ache River and the Dorbirner Ache (Rappenloch Canyon). Even the Ill River must surmount a small valley step near Feldkirch. The course of the Rhine River has been controlled along this entire stretch.

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In the old days Lake Constance used to extend further S. N of Lustenau the plain consists of lake soil piled up by the Rhine. The mouth of the Rhine delta pushes into the lake. The western one of the 2 mouths grew 0.66 sq km in 1,000 years.

The slight gradient of the valley bottom resulted in a progressive transfer of the course of the river; much fertile land was turned into swamp in this manner. Gravel bars, peat bogs, and meadows with acid soil and pastures characterize the wet soil. River control projects have been in progress since 1892 on the basis of a treaty with Switzerland. The Rhine has had a new mouth near Fussach (eastern branch, W of Hard) since 1900. A second channel was completed by Switzerland near Diepoldsau in 1913. A new dam was built along the river and the latter's course was shortened by 9.8 km.

The Rhine Valley is rich in fields and meadows. The valley bottom is adversely affected by winter fog, but the foehn and the large water surface of Lake Constance produce an effective temperature rise; this promotes the growth of orchards and some vineyards along the eastern edge, which in the past used to reach as far as Bregenz. Grain cultivation takes third place after maize and potatoes.

The Rhine Valley is a busy industrial region which received its impetus from neighboring Switzerland. The knitting and lace industry is rather old in this area and used to be one of the domestic crafts in addition to agriculture. Its centers are Lustenau (population: 10,300), Hoechst (population: 2,700), and Hard (population: 4,700). Of more recent origin are the large plants for the production of cotton goods (spinning, weaving, bleaching, dyeing, and cloth printing factories). The oldest plant was founded in Dornbirn in 1795; there we find one of Austria's largest silk weaving plants today. With

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a population of 22,500, Dornbirn is today Vorarlberg's largest community (it has been a city since 1901; "Dornbirn Export and Sample Fair"). Of considerable significance are also the clothing and machine industries (including elevators, cable cars in Feldkirch), the wood and paper industries (Frastanz and Sulz), and the food industry (bouillon cubes, canned goods, paste goods in Bregenz, Hohenems, Rankweil, etc). The population density in the Rhine area is therefore quite high (over 300 per sq km in the N, over 200 in the S). More than 60% of Vorarlberg's total population live in the Rhine Valley which constitutes only 10% of the land surface. The settlements lie mostly along the fringes and often take the form of spacious communities amid large orchards. Some look like suburban developments in whose midst the industrial installations do not stand out particularly. Major communities are Rankweil (population: 5,200), Goetzis (5,400; organ factory), and Hohenems (6,900). The Feldkirch railroad junction (population: 15,100) with its large textile industry lies at the point where a depth line crosses the Ill River Valley between the fringe of the Alps and a dissociated member (Schellenberg). Villages and hamlets can be found on the sunny slopes at elevations of up to 600 and 900 m. The settlements along the eastern fringe of the plain are connected by the Western Railroad which comes across Mt. Arlberg; this line connects with the Swiss railroad net via Buchs and St. Margrethen and with the West German net via Bregenz.

2. Lake Constance and Bregenz, the State Capital. Of the total area of the "Swabian Sea" (538 sq km), Austria only has 38 sq km. The southern shore on Austrian territory is a uniform lake filling area.

A characteristic feature of the lake are the meter-high waves on the eastern shore which are whipped up by west winds; then there is the

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"ground swell," a continuation of the wave after the wind ceases; the "lake thunder," a rumbling that seems to come out of the depths of the waters and sounds like a series of shots; and finally the "blossoming of the lake," which occurs when the water surface is covered with the yellow blossom dust of the coniferous forests.

Where the mountains are close to the E end of the lake, there used to be the Celtic and Roman settlement of Brigantium; medieval Bregenz (upper city) sprang up on 30 m high terrace surrounding the lake, while the new city (central part) lies on a strip of land along the lake dating back to historic times.

From Mt. Gebhardsberg (600 m) the observer can get a wonderful view of the city, the lake, and the Appenzeller and Glarner Alps; the view from Mt. Pfaender (1,063 m, cable car) takes the eye even further.

Bregenz (population: 20,200; area: 30 sq km; elevation: 398 m) is the seat of the state legislature and the state government (Photo 1). Shipping and the lumber industry were of importance as early as during the Middle Ages. The planned Rhine River control project between Bregenz and Basel is expected to influence the future development of the city considerably. The most important sources of income today are tourist trade ("Bregenz Festival") and industry. Certain branches of industry developed especially well (chemical industry, sheep wool goods, machinery, food products, rubber products).

3. Bregenz Forest. A narrow-gauge railroad leads from Bregenz into Bregenz Forest. Here flysch limestone, Triassic limestone, Tertiary deposits, and glacial moraines form mountains in which plateaus (900 m) and knolls predominate in the N and W; there are only a few steep peaks, e. g., Mt. Pfaender. The Bregenz River, whose lower and middle courses run through this area, often forms

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deep gullies. The western part of the area is called Vorderwald and the eastern part Hinterwald. The name "Vorderwald" is no longer accurate since the forest was cleared in the distant past (eleventh to fourteenth centuries) and is today limited to the narrow gorges in which there are no roads due to the uncontrolled mountain streams. Meadows and pastures predominate (Photo 2). The heavy precipitation from the W (Boedele, 1,100 m elevation; 2,362 mm precipitation), which penetrates unchecked into the interior, and the weathering crust of the slaty flysch favor the growth of grass land. Pastures are found even on the slopes of the steep limestone mountains where the grass often has to be cut with the help of crampons. Tilled land is rare.

On the plateaus and in the wider parts of the valleys we find the settlements whose names often end in the syllables "-schwend" (clearing) and "-wang" (mountain meadow). Bunched villages alternate with scattered settlements. The predominant farmstead type, as in the Rhine Valley, is the Alemannic single-unit farm house.

In the Hinterwald section the landscape becomes more varied and takes on an Alpine character due to the alternation of the mountains consisting of flysch, marl, and limestone. Straticulated escarpments, grassy slopes crossed by many plates, and deep gorges vary the landscape picture. The highest peak is Mt. Hohe Ifen (2,232 m) where flat limestone layers form the karst-type "Gottesacker Plateau."

The vast grass land of Bregenz Forest makes possible highly developed animal husbandry. Alpine dairying (in Vorarlberg the term "Alpe" is more common than the term "Alm") produces butter and cheese which is as good as the Swiss product. With their income from animal husbandry, dairying, and lumbering the farmers of Bregenz Forest buy the other necessities of daily living. The knitware industry, formerly

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a widespread domestic craft, is of little significance today. Industrial installations are located in Egg (population: 2,400) at the entrance to the Bregenz River gorge (hats, clothing, lace, beer brewing). The chief community of Bregenz Forest is Bezau (population: 1,500), the terminal of the narrow-gauge railroad (Bregenz Forest Railroad).

A highway from Schroecken via Hochkrumbach to Warth (Tannberg Road) was opened in 1953.

The short Walser Valley (from Breitach to the Iller River) opens toward Bavaria (Oberstdorf); the only road leading into the valley comes from there; the valley has no connection with Vorarlberg. For this reason the inhabitants of the valley (Mittelberg, 2,800 population) are Austrian citizens within the German customs union (Figure 6).

4. The Ill River Valley. The Ill River has its source in the innermost corner of the Silvretta Group. From the source to the Kloster Valley junction, the valley section is called Montafon; from Bludenz to Feldkirch the valley is called "Innere Walgau"; from a point below Feldkirch to the river's junction with the Rhine, it is called "Aeusserer Walgau."

Due to its protected position and the effect of the foehn, the Montafon Valley has a milder climate. The climate and the good slate soil (up to Schruns) permit agriculture and orchards on the valley floor and on the terraces. More important however is the animal husbandry of the area; the valley gave its name to a kind of beef cattle called Montafon brown cattle. Sheepherding is also important.

In a valley fault pit, amid orchards, we find the communities of Schruns (2,700 population) and Tschagguns (1,600). Schruns is the

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chief settlement of the Montafon Valley (lumber and textile industry, "Montafon Loden cloth");its cattle yards are among the largest of the state. These 2 localities, as well as St. Gallenkirch and Gaschurn are frequented by foreign tourists particularly in the winter.

The Montafon Valley is densely settled. Animal husbandry, tourist trade, and the Ill River power plants are the main sources of income of the population. The inhabitants speak an Alemannic dialect but are of Romanic ancestry. Many place, field, mountain, and family names recall the Illyric-Celtic and Roman settlement periods; this is also the case in the Walgau section and in the Kloster Valley. The mixture of Old Rhaetic and the subsequent Wallisian characterizes the folklore of the area (Walser people, cf. below).

An electric secondary railroad connects Bludenz with Schruns; a plant railroad runs from Tschagguns to Parthenen at the end of the valley; from there an elevator leads to the lower dam lake of the Ill power plants (Photo 4).

The water power of the Ill River, from its source to a point below Tschagguns, is exploited by 4 large power plants (the Ill River power plants, Table 6).

The power plant installations (2 dam lakes, tunnels for glacial brooks from Tirol, an 18-km long slope, pipe line, additional storage and adjustment basins with return pumping facilities) constitute a first-class technical achievement. One-third of the water power is for the state, the rest is exported to Germany as far as the Ruhr area (Photo 5).

At the junction of the Montafon and Kloster valleys we find

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Bludenz, situated on a rubble cone (population: 10,100, spinning, chocolate, and watchmaking plants; transportation hub, tourist trade). Between this city and Feldkirch lies the 20-km long "Innerer Walgau" Valley which is up to 4 km wide. A broad floodplain meadow belt accompanies the Ill River. The settlements are located mostly on rubble cones or slope ledges and chiefly on the sunny side which has a flysch base. The foehn makes the winter warmer than in Brixen which lies further to the S. The mild climate, especially on the sunny side, makes possible agriculture and animal husbandry; the viniculture of the past has been replaced with abundant orchards. Almost every village in the valley has its textile industry.

The Grosse Walser Valley (chief settlement: Sonntag; many individual farmsteads) joins the Ill Valley from NW. The inhabitants, the Walser people -- as in the Kleines Walser Valley, at Tannberg, and in several other Alpine valleys in the area -- are latecomers (thirteenth and fourteenth centuries) from the Swiss canton of Wallis. Their main occupation is dairying. Their dialect and building type are called "Walliser" and are different from those of the rest of the population of Vorarlberg.

Toward the Rhine plain the Ill Valley is blocked by a limestone rock formation through which the river breaks in the form of a gorge.

<u>5. The Arlberg Pass Area</u>. The line formed by the Kloster Valley, Arlberg Pass, the Stanzer Valley, and the Rosanna Valley in general constitutes the boundary between the Limestone Alps to the N and the Central Alps to the S. The Kloster Valley (Bludenz -- Stuben) is surrounded by high, forest-covered steep slopes; the narrow valley floor shelters a few villages. The climate is raw. The chief settlement is Dalaas near which we find a railroad power plant.

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Going up the valley, we arrive at the Lake Spuller power plant near Wald; this plant is fed by dammed-up Lake Spuller which in turn is also fed by water from Lake Zuerser via a tunnel; going down the valley these water bodies are reinforced by the Alfenz River and are once more exploited by a power plant near Braz which had to be blasted into the rock due to the narrowness of the valley.

The highway and the railroad meet at Langen; the railroad then runs through the Arlberg Tunnel.

The single-track Arlberg line was built by Senior Construction Counsellor Julius Lott between 1880 and 1884. With its many daring bridges in Vorarlberg and Tirol, its protective facilities, its tunnels and curves, and its vistas of gaping canyons and towering mountains, it is one of the most beautiful Alpine lines. The longest tunnel (10.25 km) is located between Langen (elevation 1,217 m) and St. Anton (elevation 1,303 m). It was Austria's first electrified line.

Going up the valley from Stuben, the new Flexen Road, built in 1896, branches off via Flexen Pass (1,784 m) to Zuers and Lech and on into the Lech Valley. Skillfully blasted out of the rock, it takes second place after the Mt. Grossglockner Alpine Highway as one of Austria's magnificent pass roads (Photo 6).

Through a trough valley, feared in wintertime on account of its avalanches, the Arlberg Road continues on to Arlberg Pass (the word "Arle" means mountain pine) ~~which~~ originated during the ice age. The pass heights (1,800 m) are treeless (Photo 7). They form the boundary between Vorarlberg and Tirol and the divide between Rhine and Danube. Running via St. Anton, the road reaches Landeck.

The medieval bridle path over the pass, with its hostelries at

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Kloesterle (founded in 1218) and St. Christoph (founded in 1386), was replaced by a road during the reign of Joseph II; it was skillfully improved between 1822 and 1825. When the Arlberg railroad was built, the highway lost its importance, but regained it with the advent of the automobile and with the upswing in the tourist trade.

The elevation, the highly varied terrain formations, the heavy precipitation (1,931 mm at Langen), the long winter, and the good traffic connections have made the Arlberg Pass area an international winter sports center (Stuben, Zuers, Lech, St. Christoph, St. Anton) (Photo 8).

III. Economy

Vorarlberg's numerous iron, copper, silver, and lead ore deposits have not been worth mining for a long time. The small brown coal deposits in the Vorarlberg Molasse (Mt. Pfaender area) are mined only in times of emergency (most recently in 1946-1948, Wirtha Gulch). There is a cement plant at Loruens. The exploitation of the large gypsum deposits is hampered by the fact that the latter are mostly situated far from transportation routes (mining operations in the Montafon and Kloster valleys). The state also has about 20 mineral springs (iron, sulfur, and magnesium sulfate springs) which only have local significance.

During recent decades the cultivated area dropped to 1% (Table 4) of the total area. The state's grain crop in general only covers its requirements for 2 weeks. Today less than one-fifth of the population lives off agriculture and forestry; most people make their living in animal husbandry; the number of cattle (1952 census) per 100 inhabitants (32) is Austria's lowest (not including Vienna) and is below

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the overall average (34). On the whole the forests can supply only the state's own requirements. The wood-processing industry depends on imports.

Vorarlberg is still Austria's relatively most densely industrialized area, although during the last decade other parts of Austria expanded their industry to a greater degree than this federal state. Vorarlberg is the center of Austria's textile industry (Dornbirn). The raw materials however must be imported to a great extent. This industry employs more than one-fifth of the industrial workers of Austria (federal average: 4%). Second place is held by the iron and metal processing industry.

Vorarlberg exports textiles, clothing, wood products, paper, and electric power. The knitware, lace, and watchmaking industries depend almost exclusively on exports. The income from the tourist trade during the summer and even more so during the winter are of great importance in Austria's overall economy.

IV. Government and Population (Table 10)

The "Four Dominions before Mt. Arlberg," which were given the general name "Vorarlberg" as late as 1725, were under the government of the State of Tirol until 1918 (Vorarlberg has had its own provincial legislature since 1861); it was again under the government of Tirol from 1938 to 1945; it once more became an independent federal state in 1945.

Vorarlberg is divided into 3 administrative districts: Bregenz, Feldkirch, and Bludenz.

Almost one-third of the population lives in the 4 cities of Dornbirn, Bregenz, Feldkirch, and Bludenz. These cities, in addition

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to the municipal area, also include several villages and hamlets (Bludenz: 3 villages and 5 subhamlets; Bregenz: 3 villages, 4 subhamlets, and 8 hamlets; Dornbirn: 4 villages and 28 hamlets; Feldkirch: 5 communities). Each of the 96 communities consists mostly of hamlets, subhamlets, and individual farms among which the Alemannic farm house type predominates. About 5% of the population live at elevations of 1,000 m and higher. The population speaks an Alemannic dialect.

BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
Employed People 97,000	26%	51%	11%	4%	4%	3%	-	1%
Occupational subdivision of the population	18%	47%	12%	4%	5%	2%	8%	4%

Compare and compile:

Lakes located in the state; major power plants (Table 6); branches of industry represented in the state; population increase since 1934 (see Note).

([Note] The strong population increase is chiefly due to the immigration of stateless individuals whose integration into the economic life is not easy. Some enterprises which failed abroad have found a new home in the state, e. g., weaving plants (Dornbirn, Goetzis), a stocking plant (Rankweil), an organ factory (Goetzis), and a plant producing electric motors (Rankweil), etc.)

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Tirol

Area: 12,650 sq km; population: 427,000 (1934: 349,100); relative population density: 34 (Table 10).

I. Location (map exercise)

Neighboring states bordering on Tirol; boundaries which follow the watersheds; passes connecting Tirol with foreign countries and other federal states; sections of the Alps belonging to Tirol; geologic structure (cf. map in atlas).

II. State Sections

1. The Inn River Valley and Innsbruck, the State Capital. The Inn Valley mostly represents the boundary between the Limestone Alps and the Central Alps. These opposite formations create a varied landscape picture whose beauty is increased by the alternation of narrow and wide sections.

From the S the valley is joined by long, well-settled valleys with good transportation routes; from the N the valley gets merely short, rubble-filled valleys, some of which are nothing but gorges.

The Martins Wall, which juts out into the valley W of the city of Innsbruck, divides the valley into the western upper Inn Valley and the eastern lower Inn Valley (photos 10 and 12).

Along the 185 km long stretch from the Finstermuenz narrows to the Kufstein narrows, which were created by glacial bosses, the Inn Valley was probably created by a Tertiary submergence (fracture line). The ice age shaped the formations of the Inn Valley; this is borne out by the terraces which appear now on the S side and then on the N side of the valley; in this connection several of these terraces were formed on top of each other.

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Near Landeck the terraces are at an elevation of 1,200 to 1,300 m, near Telfs at 1,030 m, near Innsbruck and the Gnaden Forest near Hall between 700 and 900 m, near Kufstein at 730 m. Sometimes they take the form of small rock ledges, sometimes they are almost a broad "upland" with villages and hamlets; from Woergl to Kufstein they look like moraine landscapes with knolls and hollows bearing tilled land, meadows, and woods. The trough shape of the valley is often concealed by rubble cones and rock slides; except for the Oetz Valley and the Ziller Valley, all southern lateral valleys join the main valleys via steps.

The mighty alluvial cones of the rivers and creeks coming from the sides, the Inn River is forced to meander along its wide valley sections. In many places the river bed is not at all deep so that follding is frequent despite river control projects. For this reason meadows predominate on the valley floor and the settlement in many cases are situated on the extensive, dry alluvial cones.

The climate of the Inn Valley is favorably affected by its position which is protected against the N and by the effect of the foehn.

The precipitation is smaller than that at the northern foot of the Alps (Mittenwald, 1,314 mm; Schwaz, less than 1,000 mm; Innsbruck, 917 mm; Landeck, 706 mm). There is less snow during the winter likewise. The cloud cover is less than that of Vienna (Vienna: November to March, 16 clear days; Innsbruck: same period, 45 clear days). Contrary to the rule (general increase in precipitation with rising elevation), precipitation decreases as we go up the valley (Kufstein, 1,500 mm Innsbruck, 917 mm; Imst, 741 mm Ried, 585 mm). Correspondingly, there is less snow during the winter.

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The effect of the foehn is noticeable particularly in the spring and fall, i.e., when the blossoms come out and at harvest time. As a result of the foehn, Innsbruck's annual mean increases by 0.6°. Autumn is 3° C warmer than in flatland areas of the same latitude.

The result is abundant plant growth such as it cannot be found elsewhere in Austrian Alpine valleys at the same elevation. Fruit (peaches, apricots) grow at elevations of up to 700 m. At Oetz and Landeck, maize grows at elevations of up to 900 m. In the upper Inn Valley the main grain types are maize and rye, in the lower Inn Valley rye and wheat. Winter wheat grows up to elevations of 1,000 m, summer wheat up to 1,200 m. The fields and settlements often are found higher along the mountain slopes on the shady side than on the climatically favored sunny side which lies on limestone (rubble, rocks, steep slopes).

The ice age terrace sections, the direction of the valley furrow which favors transportation routes, and the good pass connections, and the remarkably mild climate constitute characteristic features of the Inn Valley.

The connection with Vorarlberg is established via the Arlberg Road and the Arlberg railroad line, both of which reach the Inn Valley at Landeck (elevation: 816 m; population: 5,600; carbide and ferrosilicon plant, textile industry). The city lies at the junction of the Arlberg Road and the highway coming from the upper Inn Valley.

In the upper Inn Valley the settlements can be found on the slope ledges as high as 1,200 m and more, e.g., Ladis, 1,190 m; Obladis, 1,390 m; (sulfur springs, mineral water). The road runs via Finstermuenz to Switzerland and via Nauders to Reschenscheideck

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Pass into the upper Etsch Valley. Landeck is also the starting point for tourists visiting the Lechtaler Alps (Parseier Peak), the western Oetztaler Alps (Kauner Valley, Gepatschferner Glacier, and the Silvretta Group (Paznaun Valley, Ischgl, Galtuer)). Reschenscheideck Pass is the link with the Vintschgau Valley; this is the starting point of the railroad line which leads to Bozen via Laaz (marble quarries) and Meran. From the Vintschgau Valley a road built by the Austrian government between 1820 and 1824 leads to the Veltlin Valley via the Stilfserjoch Saddle (2,757 m).

The highway and the railroad lead down the valley via Zams to Imst (elevation: 828 m; population: 3,900; metal, wood fiber, and textile industries) where the Reutte -- Fern Pass -- Nassereith road meets the Inn Valley road.

The Imst-Pitztal railroad station is the starting point for trips to the Pitz Valley; from the Oetztal station there is a bus line leading into the Oetz Valley via Oetz and on to Zwieselstein and from there to Obergurgl and Vent.

Because the Inn Valley is very narrow at the points where Pitz Creek and the Oetztaler Ache River enter the valley, no settlements could rise there. The above railroad stations also had to be built away from the river junctions.

The Oetz Valley is the longest longitudinal valley of the Inn Valley (60 km).

The lowest valley section is wide and has a mild climate as well as a valley floor thickly covered with fields on which maize and flax grow well. Meadows and woods predominate in the central valley section. Laengenfeld (1,179 m) has sulfur springs; Soelden (1,377 m) is a well-known summer resort and the starting point of a

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cable car to the winter sports resort at Hochsoelden (2.070 m). The two source branches of the river meet at Zwieselstein (1,472 m). The Venter Valley leads to Vent (1,893 m); the Gurgler Valley leads to Obergurgl (1,927 m), Austria's highest parish hamlet. From Vent, via Austria's highest situated permanent settlement, called Rofenhoefe ((2,014 m), and via the Hochjoch hostel (2,414 m) we arrive at Hochjoch (2,875 m) and penetrate into the Schnalser Valley (Italy), and on into the Etsch Valley. In view of property conditions, herds of sheep are today, as for many centuries in the past, being driven from the Schnalser Valley via the cie-covered Hochjoch and Niederjoch saddles and the Gurgler Eisjoch Saddle (3,152 m) to spend the summer on the Alpine pastures of the Vent and Gurgler valleys. In 1952 more than 3,200 sheep were transferred; more than 2,200 came via Niederjoch Saddle (3,017 m) (photos 15, 16).

Near Telfs (elevation: 633 m; population: 4,700; cotton spinning, weaving, and Loden cloth plants) the road comes in from Fern Pass via Nassereith. It runs across the deusely settled Mieminger Plateau. At Zirl (622 m) the road, which comes from the Isar Valley (Mittenwald, Garmisch-Partenkirchen), reaches the Inn Valley via Seefeld Saddle (1,185 m, winter sports resort). Above the village of Zilr lies the Hochzirl Tuberculosis Sanatorium right below Martins Wall which is penetrated by a tunnel of the Mittenwald railroad line. W of this place, in Reith, we find the plant of the oil shale mining area of Seefeld. Below Telfs begin the "uplands," first on the right side of the Inn River; below Zirl, near the mouth of the Sellrain Valley, the Inn Valley is almost 3 km wide. At the confluence of the Inn and the Sill (Wipp Valley), where the W-E traffic routes intersect the important N-S routes (Reutte -- Fern Pass, Scharnitz -- Seefeld -- Brenner), we find Innsbruck, the state capital, situated on an alluvial cone of the Sill River (Photo 11).

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Innsbruck (population: 95,000) lies at an elevation of 574 m and is thus the highest situated state capital.

The area along the northern river bank was inhabited as early as during prehistoric times. The settlement of Veldidena dating back to Roman times was located on the site of the present day borough of Wilten on the northern foot of Mt. Isel. The oldest part of the medieval town was located on the left bank, where it was protected against floods. The river crossing settlement dating back to the early Middle Ages was made a city in 1232 and the bridgehead on the right Inn River bank, today's Old Town section, was expanded. From 1411 to 1665 Innsbruck was the residence of the Tirolian line of the Hapsburg dynasty; there are many artistically and historically valuable buildings dating back to this period (the castle, the tomb of Emperor Maximilian I, the Court Church, the Goldenes Dachl, the Laubenhaeuser).

Today the city covers an area of 102 sq km and includes a number of formerly independent localities such as Wilten (Praemonstratensian Abbey), Pradl, Hoetting, Muehlau, Arzl, Amras, Vill, and Igls.

Innsbruck is the seat of the state legislature and the state government. It has a university (founded 1670-1677) and many secondary schools.

Innsbruck forms the point of intersection of the railroad lines Vienna -- Buchs -- Zuerich -- Paris, Munich -- Garmisch-Partenkirchen -- Innsbruck (Mittenwald Railroad), and the Brenner line. It is also the starting point of several narrow-gauge lines and many bus lines. The airport is located in the western part of the city. There is one cable car leading N to Mt. Hafelekar (summit station at 2,256 m) and another leading S from Igls to Mt. Patscherkofel (summit station at 1,960 m).

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Innsbruck has many industries; the textile industry (Loden cloth) and the lumber and food industries head the list. Tourist traffic is of great significance. The city is the starting point of many trips into the mountains; in wintertime the surrounding areas offer excellent skiing terrain, making the city the site of many international winter sports events (FIS). Mt. Isel with its memories of Andreas Hofer, Ambras Castle, Igls, and the foreland hills are being visited by many people.

Below Innsbruck the freland appears in a rather broad shape also on the left bank; most of the settlements here appear in the form of small villages and individual farms. The large alluvial cones in the valley are also densely settled. On one of these we find the city of Solbad Hall (population 10,000; saline, baths, sheepwool production, pipe plant).

It received its name and significance during the Middle Ages from the nearby salt mine. The "salt mountain" of Hall (1,426 m) lies in a trough fault of the Karwendel Range. The heavily disturbed salt-bearing layers are found here in the area of the western Bunter deposits of the Alpine Lower Triassic, while the other salt mines in Austria occur in the area of the more easterly Werfen Layers.

N of Hall lies the industrial and pilgrimage village of Absam (population 3,900; optical products, spinning plants); going down the Inn River, on the foot of the Tuxer Foothills, we find the village of Wattens (populationk4,100; optical glass, glass jewelry, polishing tools). Alluvial cone settlements can also be found at Schwaz (population 8,900; tobacco factory), Jenbach (population 4,700; machinery and engine plant, scythe plant, cardboard plant) and Brixlegg (population 1,900; copper foundry, mineral baths).

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From the fifteenth to the seventeenth centuries Schwaz (called the "head and mother of all mines" at the beginning of the sixteenth century) as well as Brixlegg and Rattenberg were important silver and copper mining centers in the graywacke zone. Copper was processed in Jenbach. The fahlerz deposits, which is connected with the clefts of dolomite, contains copper, zinc, antimony, silver, sulfur, and quick-silver. Today copper is still being mined near Schwaz and barytes are being mined at Brixlegg; at times quicksilver is also being mined.

The buildings of these mining and foundry towns reveal the prosperity of bygone days. The flowering and decline of high-living period is personified by the tiny renaissance town of Rattenberg which remained Tirol's smallest town (population 800; glass blowing establishment).

SW of Brizlegg we find the village of Alpbach which in the summer months of recent years developed into one of Europe's intellectual centers by virtue of its international university week ("Alpbach European Forum")

Near Jenbach we can see the Lake Achen power plant which uses the fall of the Lake Achen channel. A narrow-gauge line (on some stretches, a cogwheel line) connects this place with Lake Achen (929 m); this is one of the most beautiful Alpine lakes by virtue of its position and surroundings (Photo 13).

The main settlement on the lake is the summer resort called Pertisau; NW of this place oil shale is being mined. A new road is under construction from Jenbach along Lake Achen and on toward Munich.

Going down the Inn River, we find Kramsach (population 2,900;

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plants for the refinement of crude glass products, glass trade school, sawmill) located on an alluvial cone. Kundl is the site of Austria's largest penicillin plant. NE of the railroad hub of Woergl (population 6,200) lie Kirchbichl (population 3,900; cement factory) and Haering (Tirol's only lignite mine; thermal baths).

The city of Kufstein, located on the border, has a population of 11,000, a glass factory, a crystal glass plant, metal industry, chemical and pharmaceutical plants, and a cement factory; it is the starting point for trips into the Kaiser Mountains. The local peasants have been offering passion plays in the villages of Erl and Thiersee since olden times.

As a result of the presence of larger settlement, the population density in the lower Inn Valley rises to 150, while it is only 30 in the upper Inn Valley, above Telfs.

The upper Inn Valley is older Rhaetic-Romanic (see note) and the lower Inn Valley is chiefly Bavarian settlement territory. These cultural and historical facts, in addition to geographic factors, explain to some extent the settlement and building types of the Inn Valley and its side valleys. ([Note] This language was still spoken in the uppermost part of the Inn Valley as late as during the seventeenth century.)

In the western part the farmsteads in the villages and hamlets are often closely spaced despite the fact that there is enough room for settlements. In the eastern part the villages and hamlets, in their original shape, are more loosely built up. Single farm compounds are widespread. In the upper Inn Valley the wooden barn stands some distance away from the stone dwelling house. In the middle part of the valley the wooden farm building and the masonry dwelling house stand

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next to each other under one roof. In the lower Inn Valley the dwelling and farm buildings are mostly located one behind the other under one roof ("single unit house"). In the western part the farm holdings shrank in the course of time as a result of the custom of land subdivision in connection with inheritance. In the lower Inn Valley and in the Wipp Valley it is customary to pass the farm on to one heir without dividing it; as a result the farm compound and the holdings are still large and impressive today.

2. The Lech River Valley and the "Ausserfern" Area. The Lech River Valley cuts deep into the area between the Lechtaler Alps and the Allgaeuer Alps; it has no terraces. The valley bottom is filled with rubble and river sand particularly in the middle part (Photo 14). It takes hard work to make cultivable soil out of the wasteland. Dense forests, reaching down to the very valley floor, cover the steep slopes to which clings a single road which connects the small villages and leads to Flexen Pass. Lumbering, animal husbandry, and summer tourism form the main income sources of the population which mostly speaks an Alemannic dialect.

Since there is no passable crossing in the impassable Lechtaler Alps from Flexen Pass to Fern Pass, the Austrian part of the Lech River Valley can be reached from Tirol only via the col between the Lech and Isar rivers. Moraine rubble and alluvial cones, in which we find embedded a few lakes (Lake Plan, Lake Heiterwanger), favor a more extensive field and meadow cultivation and denser settlement in this section. The area is called "Ausserfern" because, seen from the Inn Valley, it lies beyond Fern Pass. The principal settlement is called Reutte (population 3,400; Plansee Metal Plant (see note) textile industry) and forms the point of intersection of a number of roads which come from the upper Lech Valley (Flexen road), from

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the Iller River Valley (from Kempten and from Immenstadt in Bavaria), and from the Bavarian Lech River area (Fuessen and Augsburg). From Reutte we follow the old road through the narrows of the Ehrenberger Hermitage and on to Lermoos where we meet the road coming from the Isar Valley and Garmisch-Partenkirchen; we continue via Fern Pass to Nassereith either along the Gurgl Valley to Imst or across the more densely settled Mieminger Plateau to Telfs. N of Ehrwald stands the valley station of the Austrian cable car leading to Mt. Zugspitze.

([Note] This is a special plant for sintering and powder metallurgy; it produces wolfram and sintered metal alloys, sintered pure iron in the form of rods, wire, sheet metal for instance for electrodes, light plugs, heating elements, grids for electronic tubes, etc; the plant also processes molybdenum; its exports are considerable.)

Fern Pass, 1,209 m, is the remainder of a valley channel which in earlier times led southward and which was filled up by a huge landslide in whose rubble mass we find small, undrained lakes (e.g., Lake Blind, 1,105 m; Lake Weissen, 1,085 m) and whose crest is formed by the pass heights; the road climbs along the steeper southern side in a wide loop. The remnants of the old medieval trade route from Augsburg to Italy are still preserved. The lively traffic of olden days is reflected in the still impressive farm houses in the villages of Lermoos and Ehrwald. The small town of Vils (population 900) used to be a free imperial town. In the Inn Valley this road continued on via Reschenscheideck Pass and via Brenner Pass.

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3. The Stubai Valley and the Brenner Pass Area. The well-settled Stubai Valley with its broad floor forms the valley of Ruetz Creek and can be reached from Innsbruck via a narrow-gauge railroad. In this valley we find an old small-scale iron industry whose centers are Fulpmes (iron products for trade and agriculture, mountaineering equipment) and Mieders. This industry is based on iron ore mining which was in progress there in the old days. The steep fall of Ruetz Creek leads to the Ruetz power plant.

The Wipp Valley represents a common name for the Sill Valley and the uppermost Eisack Valley up to the granite narrows of Franzensfeste. The Sill River cut a deep gorge into the broad ice age terraces particularly in the lower part of the valley. Above Matrei and Steinach the valley slopes rise step-like to the flat area of the Brenner saddle (1,371 m).

The saddle area lies in a large hollow of the mountain ridge. From here the Inn Valley glacier used to flow S and created a narrow trough valley in the easily weathered limestone and clay slate in this section; the remnants of this narrow trough valley today contain the saddle.

The Brenner furrow is not as much favored by the climate as the western valleys.

The rough north winds can roar through the Wipp Valley and across the pass without opposition. In the Sill Valley the cultivation and settlement lines are situated on lower elevations than in the Oetztaler and Zillertaler alps (grain cultivation up to 1,250 m). The upper Eisack Valley also reveals these more unfavorable climatic conditions. Nevertheless the settlements on

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both slopes of the Brenner furrow climb sufficiently high and in comparatively great density; this is due to the formerly rather heavy highway traffic.

The Brenner railroad runs past Matrei (992 m; major animal market town). Steinach (1,051 m; population 2,000) lies at the juncture of the Gschnitz Valley which forms the shortest access route to Mt. Tribulaun (3,096 m) and Mt. Zuckerhuettl (3,507 m). Near St. Jodok the Schmirn Valley opens toward the E, leading to Tuxer Joch (2,340 m; passage to Ziller Valley); there is a valley leading from Gries am Brenner (1,163 m) to the Mt. Tribulaun Group. NE of this place anthracite is found in the carbonaceous layers in small quantities on the slopes of Noesslachjoch at elevations between 1,600 and 1,700 m. (Mining was discontinued in 1953.)

The Brenner saddle lies on Italian soil, as do Brenner (Brennero) Station and Brennerbad (thermal springs).

The southern branch of the pass is much steeper. On the Eisack we find Gossensass (seat of a Gozzo, not a Goth; Italian name: Colle Isarco) (1,100 m) h which is protected against N and therefore became a mountain health resort and winter sports center, and the old German town of Sterzing (Vipiteno). Moving NE, we reach the Ziller Valley via the Pfitscher Valley and Pfitscher Joch (2,251 m); there is a road leading SW via Jaufen Pass (2,094 m) into the Passeier Valley and to Meran. The railroad follows the Eisack which flows through a granite canyon, called "Sachsenklemme" (during the war with the French in 1809 more than 500 Saxonian troops were captured here), N of Franzensfeste. The exit of the canyon is called Brixner Klause; here lies Franzensfeste (Fortezza, 777 m) which dominates the passage to Brenner Pass and the entrance

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to Puster Valley. At the confluence of the Eisack and Rienz, on a terrace in the basin, lies the former Imperial bishopric city of Brixen (Bressanone). In the broad valley fault pit at the confluence of the Eisack and Talfer rivers (Sarn Valley), on old terraces, we find the city of Bozen (Bolzano) situated in a protected and climatically very favorable area amid abundant orchards and vineyards. From here the Vintschgau railroad leads to the health resort of Meran (Merano) which is known for its mild winter climate.

Brenner Pass is the lowest crossing point in the East Alps and can be negotiated in a single approach.

The Brenner road was of great importance already in Roman times; it was an artery of culture. In the Middle Ages it was the road of kings; this accounts for the efforts of the German kings to gain control of the area around the road. Many German kings made pilgrimages to Rome on this road. Herder and Goethe took the same road. The present road was completed in 1772. The settlements along the road greatly benefited from the bustling trade and freight movements. As late as 1860 more than 25,0000 [sic] wagons traveled on this road. Things have quieted down on the road since the railroad Kehr tunnel was opened up in 1867 (built by engineer Karl von Etzel; first use of curved tunnels). The transformation of the settlements into summer and winter resorts and automobile traffic finally brought to the area another business upswing.

4. <u>The Ziller Valley</u>. The lower part of the valley lies in the slate zone; it is very broad, has many meadows, and is densely settled. The slopes are heavily wooded. The narrow-gauge Ziller Valley railroad runs to Zell am Ziller (575 m). From here a motor road leads to Gerlos past the dam lake of the Gerlos power plant.

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The connecting link of the road via Gerlos Pass and on into the Pinzgau Valley is under construction. The terminal of the Ziller Valley railroad is at Mayrhofen (630 m; population 2,400; magnesite industry). (This is today Austria's highest situated industrial enterprise (1,670 m).)

Near Mayrhofen we leave the slate zone via a sharp break in the profile and get into the crystalline zone of the Zillertaler Alps. There we find the so-called "Gruende" -- the name for several branches of the uppermost Ziller River section and Zemm Creek. These are tall, roomy valley troughs imbedded in gneiss; they have a wide valley terminal and powerful steps (power plants, e. g., at Boesdornau, S of Mayrhofen). These "Gruende" sections are closed off by the magnificent glaciated mountains of the Zillertaler Alps.

The climate of the Ziller Valley is much more favorable than that of the Wipp Valley. There is agriculture (wheat and maize) to be found on the broad valley floor whose incline is rather uniform in the slate area. The most important source of income of the valley population is animal husbandry (Tuxer beef cattle) which is favored by the presence of meadows and pastures. Zell am Ziller is the market locality of animal exports. In this part of the valley the population density is so high (50-75) that some of the people have to find their livelihood elsewhere. The lively tourist traffic offers the few settlements of the valley a new source of income; the "Gruende" area is rather thinly settled. Old-style dress and many old customs have been preserved in this section.

5. <u>The Kitzbuehler River Area</u>. This area lies in the northeasternmost corner of Tirol.

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As parts of the northern Limestone Alps we find here the steep and heavily wooded Kaiser Mountains (Photo 17) and -- heading toward the State of Salzburg -- the heavily karsted Loferer and Leoganger Steinberge Mountains with their steep matterhorns and their small plateaus.

S of this area rise the Kitzbuehler Slate Alps, a part of the graywacke zone. The rock, rather soft in places, form rounded summits, broad ridges, and gentle slopes (Photo 18).

From one of the elevated points we can see a varying landscape picture, for the "grass mountains" are bordered in the N by the steep "stone mountains" of the Limestone Alps and by the "kees" mountains, i. e., the glaciated Hohe Tauern Mountains, in the S; the various parts are separated by broad valley depressions.

Mountain structure and soil formation are decisive factors affecting the economy of the Slate Alps. In the slate rock we find first of all copper ore; the broad valleys and their moraine rubble favor agriculture. The sunny side of the slopes is settled to rather high elevations; the woods are in parts limited to narrow belts; the alpine pastures extend to the very heights and facilitate a rich animal husbandry. The accessibility of the area made it ideal for transportation routes and the snow-rich winter plus the gentle mountain formations favored winter sports development. The centers of winter sports activities are Kitzbuehel, Saalbach, and Zell am See.

Kitzbuehel (population 7,200) is the principal settlement; its development is based on the 3 former copper pyrite mines in the area S of the city; today the city is a tourist center with several cable cars. The road from Salzburg winds its way from the S via

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Thurn Pass (1,274 m) and continues northward via St. Johann in Tirol (cattle market) to Ellmau and Woergl. Fieberbrunn (population 2,700; sulfur and iron mineral bath; chemical and pharmaceutical plant, sawmill) lies on the railroad line to Salzburg. The northernmost locality of the area is Koessen with its glass industry. (This village gave its name to the marly and slaty limestone of the Upper Triassic ("Koessen layers").)

6. East Tirol. This is the area of the upper Drau River and its tributary, the Isel River, as well as the uppermost Gail Valley (Lesach Valley). As a result of the border revision of 1920 East Tirol was completely cut off from the rest of Tirol.

The Puster Valley is the valley landscape of the Rienz and uppermost Drau rivers from Muehlbacher Klause in South Tirol to the Drau narrows below Lienz; this is the old link between South Tirol and Carinthia. The Drau Valley begins on Toblacher Plain (1,210 m) -- a valley divide -- and is very broad. The principal settlement of the uppermost Drau Valley, Sillian (1,102 m, population 1,700), is Tirol's highest situated market town; there is a bus line running from there into the Gail Valley. The valley becomes narrow in the Lienzer Klause section. This section opens up toward E into the Lienz Basin which is 3 km wide. There is a narrow valley section, caused by a limestone block on the left bank, before we get to Oberdrauburg (Carinthia); this is called the "Tirol Gate."

On the edge of the fertile Lienz Basin lies the capital of East Tirol, Lienz (673 m; population 10,000; sawmill; Photo 19).

Nearby stood the Roman settlement of Aguntum whose ruins were gradually covered by gravel. Lienz is a tourist center and the starting point of many bus lines, e. g., one via the Mt. Grossglockner Alpine Highway.

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The climate of Lienz, like that of the upper Puster Valley, is dry but warmer. Maize is grown around the city.

The Isel River, which is 3 times as wide at its mouth as the Drau, surrounds with its tributaries the settlement and economic area of East Tirol. As in the Drau Valley, there is a clear distinction between the sunny and shady sides of the valley slopes in the Defereggen and Virgen valleys; there we can find farms as high as 1,600 m elevation; the forest strip is wider on the southern side of the valley; in the Tauern and Kalser valleys the forest strips are equally wide. In the innermost corner of the Defereggen Valley lies St. Jakob (population 900) at an elevation of 1,389 m; there we also find Trojach, East Tirol's highest situated permanent settlement at an elevation of 1,705 m. The principal settlement of the Isel Valley is Markt Matrei (population 3,100; main cattle market, formerly called Windisch Matrei).

Let us divide the "market community" of Matrei in Osttirol (278 sq km, 602 houses) into its component parts so that we may study a characteristic example of settlement and population distribution in favorably located mountain sections. This community consists of the compact part represented by Matrei/Markt (population 1,167) and a group of scattered houses on the one hand; on the other hand there is the part represented by Matrei/Land (population 1,897) which consists of 2 villages, 6 subvillages, 12 hamlets, 18 groups of scattered houses, 10 Alpine refuges and restaurants, and 2 individual houses.

The comparative inaccessibility of the valleys of East Tirol caused local dress and customs to be preserved to this day; the local folk characteristics were also preserved and are distinguished

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by profound religiousity, great industriousness, and simple living. It is believed that the population may have originated from the Illyrians in view of their features. As far as farmstead types are concerned, we find the Tirolian single-unit farm and the Interior Alpine paired compound.

III. Economy

Tirol's formerly rich resources, including silver, lead, and copper ore deposits at Schwaz, Rattenberg, and Kitzbuehel, have now been exhausted. There are however some deposits left which are of significance to the state; these are salt at Hallein, brown coal at Haering (which is nearing its end), small quantities of anthracite near Noesslach in the Wipp Valley, magnesite near Mayrhofen and Fieberbrunn; oil shale mining near Seefeld and in the Baechen Valley forms the basis for ichthyol products; limestone and marl deposits facilitate cement production in the large plants at Vills, Kirchbichl, and Kufstein.

Of some significance also are the deposits of barytes and copper pyrites near Brixlegg, fahlerz at Schwaz, quartzite at Stainach, pyrite at Sillian, and lead and zinc ores at Nassereith; of these however only barytes, quartzite, and fahlerz were mined in 1953 (Table 5).

With the exception of the springs at Solbad Hall, the approximately 30 mineral springs of the state are only of local significance.

Agriculture is confined to small areas (Table 4); these are found on valley floors and upland slopes. We also find various kinds of fruit cultivation here; the new orchards with artificial irrigation in the Kauner Valley are notable in this respect; there is even

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viniculture in the Inn Valley near Zirl. For its feed, the state depends mostly on imports from Austria and abroad. Almost 90% of the farming areas consist of meadows and pastures. The basis of the Tirolian economy, which consists mostly of small and medium holdings, is thus formed by animal husbandry.

In 1952 there were 44 head of cattle for every 100 inhabitants (Austrian average: 34). The Tirolian breeds of cattle are very tough and efficient and are therefore exported abroad (Bavaria, Italy). Sheepherding forms the basis of the old woollens and Loden cloth production.

Forests cover one-third of the total surface. The rich forests caused the development of a ramified sawmill industry and furnish the raw material for handicrafts and industrial wood processing.

The percentage of the forested area is somewhat lower than the Austrian average but of all the federal states, Tirol has the largest forest percentage per inhabitant (122 ha per 100 inhabitants; Austrian average: 46 ha). Most of the lumber has to be exported abroad. In contrast to the times prior to 1937, it has been possible since 1945 to export much more lumber than timber. A portion of the product of the wood processing industry is also exported abroad (wooden houses, crates and fruit containers, skis from Kufstein). The forest economy employs approximately 12,000 people.

Tirol is very rich in water power. There are great possibilities for the expansion of these resources, especially in view of the favorable location of the state between Germany and Italy.

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Even today Tirol's 4 huge power plants -- those at Lake Achen, Gerlos, Kirchbichl, and Boesdornau -- export more than 60% of their power to the other federal states and abroad (Bavaria, Italy). About 95% of the state population is supplied with electricity; this puts Tirol at the head of the other federal states in this respect. The planned power plants -- those on the Inn River, in the Oetztaler Alps, on the S side of the Mt. Glockner and Venediger groups -- should be able to produce 4.5 billion kwh, i. e., about 5 times today's output.

Though Tirol's contribution to Austria's overall industrial effort may be small (about 5%), the products are varied and of high quality. Some plants produce goods not produced anywhere else in Austria.

The textile industry employs the largest number of people. A new silk factory was built in Silz (upper Inn Valley). The glass factory in Wattens gained world renown; this is the state's largest industrial plant; it also has an abrasives plant in Schwaz and a plant for the production of optical instruments in Absam. The glass jewelry of this plant is exported to many countries of the world. The second largest plant of the state is the "Jenbacher" Plant which turns out diesel motors, compressors, and elevators and cable car bodies. The molybdenum and wolframite products of the "Metallwerk Plansee" plant are very popular abroad. In Kundl we find Austria's first penicillin plant. Brixlegg has Austria's only copper smelter.

The number of employed individuals more than doubled between 1937 and 1950. During the war Tirol witnessed the establishment of factory branches and new plants; in recent times

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former stateless individuals also contributed to this effort by setting up, e. g., tax the glass factory at Kufstein. A new industry is also represented by the production of sewing machines in Kematen and of cast iron pipes in Hall. The lack of raw materials and the mountainous configuration of the state of course limit any major expansion of industry.

Although industry is spread all over the Inn Valley from Telfs to Kufstein, it does not disturb the general appearance of the landscape. The workers are more tied to the soil than those in the other industrial areas of other federal states by virtue of the fact that they own their own homes, have their shops in or near their homes, and own small weekend homes and gardens.

An agreement between Austria and Italy makes it possible for the State of Tirol (in combination with Vorarlberg) and the autonomous area of Trentine (South Tirol) to engage in a special kind of barter trade involving characteristic goods and products.

An agreement was also signed for the direct traffic connection with South Tirol; this greatly facilitates travel between North and South Tirol.

Tourism is of great significance.

Tirol became a first-rate tourist center before all other federal states due to its favorable situation transportation-wise, its high mountains with their rock climbing and glacier areas, lakes, skiing terrain, cities with beautiful old buildings, and friendly and neat villages. In many a valley the mountain farming landscape was transformed into a tourist landscape by the many hotels, the expansion of the farm houses to accommodate tourists, the good roads, the cable cars and skilifts.

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IV. Government and Population

In addition to the state capital at Innsbruck, there are 8 administrative districts (Innsbruck area, Imst, Landeck, Reutte, Schwaz, Kufstein, Kitzbuehel, Lienz).

The 10 cities (Innsbruck, Solbad Hall, Schwaz, Rattenberg, Kufstein, Kitzbuehel, Landeck, Imst, Vils, and Lienz) house one-eighth of the population; these city areas in many cases also include villages, subvillages, hamlets, and individual farms. Only 3 cities are located in the western part of the state; of the remaining 590 settlements in Tirol only 8 are market communities (Brixlegg, Hopfgarten, Matrei am Brenner, Matrei in Osttirol, Reutte, Sillian, Steinach, and Telfs). About 15% of the population live at elevations of 1,000 m and higher.

The Tirolian dialect belongs to the South Bavarian group of dialects.

BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

Employed people	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service
206,000 (A)	36%	37%	13%	5%	5%
Occupational Subdivision of the Population (B)	26%	35%	13%	4%	5%

	Domestic Service	Unemployed	Unknown
(A)	3%	-	1%
(B)	2%	11%	4%

Compare and compile:

Passes leading into other states and countries. Tirol's lakes. Proportional size of farmland, forests, and pastures

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(Table 4). Size of unproductive area of Tirol compared to that of other federal states (Table 4). Natural resources being mined at this time (Table 5). The state's most important industries. The major power plants (Table 6). The percentage population increase from 1934 to 1951 and the resulting problems.

Salzburg

Area: 7,150 sq km; population: 327,200 (1934: 245,800); relative population density: 46 (Table 10).

I. Location (map exercise)

Parts of the Alps and Alpine Foreland situated in the state. Parts of the state boundary not following the divides. Geological structure (map in atlas).

II. State Sections

1. The Pinzgau Valley. This area covers the upper Salzach Valley above Bruck and the upper Saalach Valley. The local population distinguishes between Upper Pinzgau (principal community: Mittersill), Lower Pinzgau (principal community: Zell am See), and Middle Pinzgau (Saalfelden area).

The longitudinal Salzach Valley is considered to be the result of a trough fault in view of its layout; this is confirmed by the remarkably straight line of the trough and the fact that it does not constitute a rock boundary.

The Upper Pinzgau area includes the upper longitudinal valley of the Salzach above Bruck; this is a wide, heavily rubble covered and swampy trough into which empty all of the Tauern valleys except the Fuscher Valley in the form of large steps with huge rubble cones. In this rough valley section the population engages in meadow and

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pasture farming (beef cattle and horse breeding, Pinzgau breed). Dams had to be constructed to protect the fields and meadows against the floods of the Salzach River (Photo 20).

The settlements are located on the valley ledges or on the alluvial cones, such as Markt Mittersill whence the federal highway leads via Thurn Pass into the Kitzbuehel area (Photo 18). The sunny-side, terraced slopes of the Kitzbuehler Alps bear fields, meadows, and farm houses up to elevations of 1,070 m; on the shady side, on the foothills and in the valleys of the Hohe Tauern Mountains, the sparse grain cultivation extends only up to 950 m. Nuekirchen is the market community and starting point for trips into the Mt. Gorss-venediger Group in the western part of the valley. Krimml (Krimml cataracts, 3 steps, 450 m) is the terminal of the narrow-gauge rail-road which connects Upper Pinzgau with the city of Zell am See.

The Middle Pinzgau area includes the valleys of the uppermost Saalach area and the Saalfelden Basin. Saalfelden (population 8,300) is the chief market community. The basin opens up toward the W via the valley pass of Griessen, an excellent route for the railroad. N of Saalfelden, below the Saalach narrows near Luftenstein, lies the market community of Lofer at the foot of the Loferer Steinberge Mountains; from there a road leads to Reichenhall via Stein Pass; another road leads to North Tirol via Strub Pass (this is an easier route for motor vehicles along the Salzburg -- Reichenhall -- Lofer -- Woergl run).

From Bruck the trough valley turns northward and leads via Lake Zell into the Saalach Valley. The main mass of the Salzach glacier here moves northward. The drainage of Lake Zell toward N was made impossible by prepositioned terminal moraines and the alluvial cone of the Saalach River (valley divide).

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The Lower Pinzgau area (Bruck -- Lend) is not trough-shaped; the valley gets narrower here; between Taxenbach and Schwarzach it is cut into the slate in the form of a gorge. Above the gorge lies an old, terraced valley floor covered with moraines. The valley steps at the exit of the side valleys are particularly well-developed here (narrow chasms and cataracts). The valley floor offers hardly enough room for the road and railroad which in certain stretches called for daring feats of engineering. The city of Zell am See (population 6,600) located on the rubble cone of Schmitten Creek, is a tourist center by virtue of its location (Photo 21). Its surroundings offer many scenic views (Schmittenhoehe Peak, 1,968 m; cable car, skilifts); the city is also a transportation hub. From it bus lines run via the Mt. Grossglockner Alpine Highway which connects the Salzach Valley with the Moell Valley (Photo 22).

The road leads via Bruck through the Fuscher Valley (a branch leads to Bad Fusch, 1,188 m) and on to the Alpine pastures of Ferleiten; it winds its way upward along the eastern side ridge to Fuscher Toerl (2,428 m; 117 m long tunnel), drops to the valley terminal of the Seidlwinkel Valley (source valley of the Rauriser River), climbs over the main ridge at Mt. Hochtor (2,505 m; 311 m long tunnel), and descends to Heiligenblut (1,288 m; 47.8 km). A branch, before we get to the latter village, shoots off and leads via Mt. Glockner House (2,131 m) to Franz-Josefshoehe (2,362 m; 8.2 km; Photo 23). This road is the second-highest road in the Alps and represents a brilliant achievement of Austrian mountain road engineering. It was opened to traffic in 1935 (toll road) and was built by engineer Wallack.

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The huge Glockner-Kaprun Tauern power plant is under construction in the Kaprun River Valley.

In 1951 the Limberg Dam was completed; the dams of the Moserboden storage installations are under construction. The lower step of the power plant has been delivering valuable peak loads since 1949 (Figure 8).

In the Stubach Valley the water power of the Stubache River is used for the production of electric power which is entirely consumed by the electric railroad lines. The drainage of the glaciers is collected in huge storage areas, former glacial lakes, and it exploited in 3 steps by one plant each (Enziegerboden, Schneiderau, Uttendorf). The first plant was commissioned in 1929. The expansion of these railroad power plants is under way (higher dam walls, new channelling of creeks, etc).

From the market community of Taxenbach (Kitzlochklamm Gorge) a road leads to the Rauris Valley and into the area of the upper Huettwinkel Valley (Kolm Saigurn) whose name is connected with the gold mining activities of olden days.

These mining activities in Kolm Saigurn (1,628 m) led to the development of the "Rauris gold mining colony" which flowered between 1,400 and 1,600; in 1,460 there were 30 mining companies, 1,000 mines, and 2,000 miners here and in the area of the Gastein River.

During World War II attempts were made to revive gold mining particularly in the upper Gastein Valley. An attempt was made at that time to follow the gold-bearing quartz veins below ground. An 8 km long connection drift was dug between Kolm Saigurn

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and Nassfeld, the valley cirque of the Gastein River. Above Boeckstein, in the area of Mt. Radhausberg, another 2.5 km long drift has a temperature of 47° C at its end. The drift between Boeckstein and Nassfeld was at times open to tourist traffic (electric railroad); the hot drift was equipped for medical healing activities. The drift air is extremely rich in radium emanations (radium irradiation) which issue from heat clefts. The high tempera-ture of the rock and the emanations seem to be connected with hot and emanating waters.

The weather station on Mt. Sonnblick, Austria's highest, is on the soil of the state of Salzburg (Zittel House, 3,105 m).

2. The Pongau Valley. This area begins after the Salzach valley canyon between Taxenbach and Lend. The valley floor is wide as far as Werfen. The river flows through soft slate and the valley slopes are clearly terraced. From Lend the road makes a steep ascent to the Gastein Valley, skirting around the gorge of the Gastein River; the latter and the Rauris River feed the power plants whose current is used mostly in the aluminum plant at Lend. After Schwarzach-St. Veit -- 2 market communities on the northern valley ledge of the Salzach -- the Tauern railroad branches off and begins its ascent to the Gastein Valley, skillfully using the valley ledges. It tunnels through the limestone block near Dorf Gastein (836 m) and then reaches the wide valley floor ("Die Gastein") which rises only 33 m to the market community and health resort of Bad Hofgastein. The thermal water is fed to the health resort in a 5 km long pipeline from Bad Gastein (1,012 m) between whose health establishments and hotels the river drops over 2 cataracts (Photo 24).

The hot, radium-containing springs (36° -47° C) are world famous and have tasteless and odorless water.

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The Tauern railroad (railroad director doctor Karl Wurmb did an especially outstanding job in connection with the construction of the Tauern, Karawanken, and Wocheiner railroad) runs through the Tauern tunnel (8.5 km) under the main ridge of the Alps and thus furnishes an important N-S connection in the central part of the East Alps (Salzburg -- Villach). Motor vehicles can be transported through the tunnel via rail.

A road leads from St. Johann in Pongau (population 5,300) into the Grossarl Valley, curving around the Liechtenstein Gorge; another road leads via Markt Wagrein and the Wagreiner Heights (950 m) into the upper Enns Valley and to Radstadt.

From the second market community, Bischofshofen (population 7,900; lumber, clothing industries), which as a railroad hub has become more important than St. Johann, the railroad runs into the Enns Valley via the saddle of Huettau-Eben. From Bischofshofen there is a road leading into the Muehlbach Valley and to the copper ore mines near Mitterberg which were exploited as early as during prehistoric times; these deposits represent the continuation of the North Tirolian ore deposits of the graywacke zone. Iron ore deposits on the NE foot of the Mt. Hochkoenig Massif led to the establishment of the "Konkordiahuette" mine and foundry at the exit of the Bluehnbach Valley, since water power and charcoal are available there.

Bischofshofen is the starting point of trips into the Mt. Hochkoenig area with its "Uebergossene Alm," Austria's only plateau glacier.

The third market community is Werfen (population 3,100); it is called ~~Markt~~-Werfen to distinguish it from Dorf Pfarrwerfen on the site of an old Roman settlement (Photo 25).

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Hohenwerfen Fortress was built in the eleventh century and enlarged in the sixteenth century to serve as blocking fort capable of closing off the valley. Werfen is the starting point for trips to the so-called "Eisriesenwelt" in the heavily karsted Tennen Mountains. The entrance to the ice caves lies at an elevation of 1,640 m; the total length of the caves explored so far amounts to 38 km. In 1947 large caves were discovered in the Hagen Mountains; one of these was found to be the largest cave in the Austrian Alps (102 m deep shaft).

The Salzburg part of the Enns Valley, which is connected with the Salzach Valley via low saddles, has a swampy valley floor near Radstadt. The boundary between Salzburg and Styria and the dividing line between different house types (in the W the Alpine single-unit house, in the E the Karantanian bunched compound) runs through the Mandling narrows (810 m).

Radstadt (856 m; population 3,400; sawmills and lumber industry, jewelry, ceramics) lies on a valley ledge of the Enns Valley; it is of special significance to Salzburg because the old highway (Roman road) runs from there through the northern Taurach Valley (Tauernachen Valley) via the Radstaedter Tauern Mountains (1,739 m) and the southern Taurach Valley into the Lungau Valley (Photo 28).

On the N side of this valley the grain line lies at 900 m, on the S side at 1,300 m. The Radstaedter Tauern Heights has become a well-known winter sports site because of its easy accessibility. Of the 12 refuges, Seekar House is the highest situated (1,791 m).

3. <u>The Lungau Valley</u>. This area includes the valley fans of the sources of the Mur River. The basin is filled with ice age

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deposits and the slopes are rounded to rather high elevations. There are long moraine walls between Tamsweg and Mauterndorf and at the exit of the valleys coming from the N. The high position of the Lungau Valley (over 1,000 m) and the closed-off character of the basin make for a rather extreme climate with severe winters (cold temperature lakes and temperature inversions). Tamsweg is one of the settlements with the lowest winter temperatures in Austria (lowest: minus 26.2° C).

This area is characterized by rich pastures and animal husbandry. Farming is rather modest and is confined to rye and barley. Despite the good soil, the Lungau area is thinly settled.

The basin is closed off toward the E (state boundary) by a valley narrows of the Mur River (Predlitz narrows); the Lungau Valley is connected with Styria by a narrow-gauge railroad, the Mur Valley line (Mauterndorf -- Unzmarkt), and a road.

The principal settlements and market towns are: Tamsweg (1,021 m; population 3,900), Mauterndorf (1,138 m; population 1,600), St. Michael (1,068 m; population 2,200) whence the Tauern road runs to Carinthia (Photo 29) via Katschberg Pass (1,641 m). (In 1950 the steepest stretches of the road, with gradients of up to 29%, were rerouted; this made the rather hazardous road somewhat easier to drive on; the gradients were reduced to between 12 and 14%.)

4. The Tennengau Valley. This is the name given to the section between Abtenau and Hallein. This area is separated from the Pongau area by the Salzach breakthrough between the Hagen and Tennen mountains which extends from Werfen to Golling.

The narrowest point, Lueg Pass, lies E of a glacial boss around which curves a railroad line. The road avoids the narrows, climbing about 70 m. The wild gorge N of the pass is called "Salzachoefen."

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At the northern exit of the narrows, on a valley step, lies Markt Golling (population 2,900); the Lammer Valley enters at this point, coming from the E; this valley is divided into 2 basins, called "Scheffau" and "Abtenau," by the "Lammeroefen" Gorge; this is well-terraced, fertile moraine soil. The Golling Cataract plunges into the valley from the northern slope of Mt. Kleiner Goell (1,753 m).

From Abtenau (population 3,900, market community with many hamlets and individual farmsteads) there is a good road connection via Gschuett Pass (964 m) into the Upper Austrian Salzkammergut area and S into the Fritz Valley.

The soft rock (Werfen slate, Gosau layers) permits denser settlement and produces more abundant forest growth. Individual farmsteads are widespread.

In the large, heavily cultivated wide sections of the Salzach Valley below Golling we also find many individual settlements on the terraces. The market community of this area is Kuchl (population 3,000).

Near the salt mining city of Hallein (population 14,800), imbedded in the Werfen layers, we find the salt deposits which are being mined on the Austrian side from Duerrnberg and on the Bavarian side from Berchtesgaden. The old city of Hallein stands on a higher valley ledge; the modern part spreads toward the Salzach River. There we can see the industrial installations of the area (wood processing, cellulose and paper factory, tobacco factory, brewery , chemical plant, bicycle engines and small motorcycles).

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5. The Flachgau Valley. Next we come to this area and its southern and southeastern surroundings. N of the Tennengau area and the Abtenau depression, between the Salzach and the Salzkammergut area, we find the Salzburg Limestone Forealps; this mountain landscape is cut by many small valleys and is rich in forests and pastures.

Near the city of Salzburg, Mt. Gaisberg rises to an elevation of 1,288 m.

In the Wies Valley, NE of Hallein, lies the dam lake of the Wies Valley power plant; going up the valley we come to the Strubklamm power plant. There is a marble quarry at Adnet (colored limestone of the Triassic and Jura formations).

W of the Salzach the Limestone Alps end rather abruptly in Mt. Untersberg (1,973 m) with its many caves and fabled past. At its foot there is another marble quarry which furnishes Salzburg's decorative stone (light-colored limestone of the Upper Cretaceous).

N of the Limestone Forealps, from the Salzach River to Lake Mond, there extends a densely settled depression with many fields and meadows; it constitutes the connection between the state capital and the Salzburg's section of the Salzkammergut area. (Mt. Schafberg, 1,783 m, Lake Fuschl and Lake Wolfgang; tourist centers at St. Gilgen and Strobl.) Through this depression runs the Salzburg -- Ischl "Salzkammergut-Lokalbahn" railroad line.

The name Flachgau refers to the part of the area which belongs to the Salzburg Basin, i. e., the overdeepened tonguelike basin of the ice age Salzach glacier which at one time was filled

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by a large lake. In the N and NW the Flachgau area extends into the Alpine Foreland where individual wooded flysch mountains rise from the ice age moraine and delta rubble areas. This section is mostly covered with fields and meadows. Individual farmsteads are distributed rather uniformly.

The edge of the Alps is rich in precipitation (relief rain, "Salzburger Schnuerlregen"). The soils of the moraine area extend to great depths and are loamy; oat and rye cultivation predominates. We find basins with lakes (Lake Trumer, Lake Waller), moors, and peat bogs (Photo 27) in the northern frontal moraine area as well as in the basal moraine area situated to the S.

As a result of the transportation routes passing through the area, compact market communities sprang up, e. g., Seekirchen on the main rail line, for which reason Lake Waller is also called Lake Seekirchner, though the settlement is not located on the lake, and Neumarkt, as well as Strasswalchen and finally Oberndorf on the side line which runs from Salzburg to Lampredtshausen and to the southern edge of the Ibmer moor landscape.

6. Salzburg, the State Capital. There are a few isolated heights in the Salzburg Basin. They include the dolomite block of the fortress hill (542 m), Mt. Kapuzinerberg (650 m), and Mt. Moenchsberg which is considered the remnant of interglacial delta gravel. The state capital is grouped around these elevations. Between the fortress hill, Mt. Moenchsberg, and Mt. Kapuzinerberg the Salzach winds its way through a more than 100 m deep valley (Photo 26). This place offered an easy river crossing point and an ideal site for a bridgehead settlement which became the junction of the roads leading from W to E and N to S. There is also the additional factor of Salzburg's centuries-old position as the capital of an Imperial clerical principality.

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The prehistoric settlement was probably located on Mt. Rainberg, S of Mt. Moenchsberg; according to the relics found, the Roman settlement of Iuvavum stood in the area between Mt. Moenchsberg and the Salzach River; the medieval city then grew around the cloister of St. Rupert which has been the seat of an archbishop since 798. Hohensalzburg Fortress, founded in the eleventh century, was expanded several times, particularly in the sixteenth century, and dominates the city. In the fifteenth century the city began to spread to the right bank of the river and to the western foot of Mt. Kapuzinerberg.

The archbishops of the seventeenth and eighteenth centuries built many brilliant buildings and palaces ("Germany's Rome") in the city and chateaus and parks in the surrounding area (Hellbrunn, Leopoldskron, Klesheim, Anif, Aigen); Untersberg marble was used as construction material. The areas along the Salzach and S and W of Mt. Moenchsberg were not settled until the nineteenth century. A road tunnel through Mt. Moenchsberg (Neutor), completed in 1767, connects the old city with this borough. The moor areas SW of the city hindered further growth in that direction although the moors had been drained to a great extent between 1598 and 1740 (moor trail through Leopoldskron moor, Schallmoos moor).

In order to secure the passes leading out of the state into neighboring states to the W, S, and E, the archbishops, in their capacity as princes of the province, in the course of time also obtained control of certain approach areas; of this area, located beyond the divides, the state today only holds the Radstadt area and the Lungau area (Radstaedter Tauern road).

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The city (population 102,900, 424 m) is the educational center of the state; it has a theological faculty and all secondary schools of the state. As Mozart's birthplace, Salzburg plays a great role as city of music and art; the Salzburg Festival, inaugurated in 1920, is world famous and is one of Austria's greatest cultural attractions.

The city area also includes the former independent settlements of Gnigl, Itzling, Maxglan, Abfalter, Aigen, Glas, Parsch, Hellbrunn, Gaisberg, Kasern, Leopoldskron, Liefering, Rott, Gneis, Kleingmein, and Morzg (65 sq km).

The brewing, glass, wood, textile, chemical, cardboard, and leather industries have establishments in the city.

III. Economy

The state is not rich in natural resources (Table 5).

Let us just mention the copper ore mines at Mitterberg, which are being expanded, and those at Buchberg (NE of Bischofshofen) which have been opened up recently; then we have the salt mine at Hallein and the marble quarries at Untersberg and Adnet. There is a large cement plant at Gartenau near Salzburg. The Sulzau-Werfen foundry processes brown hematite from the Slate Alps (charcoal furnaces). The attempt to open up new gold mines in the old gold mining area (Sonnblick) during World War II failed.

The Gastein springs are of international significance.

The state's lack of coal resources is compensated for by the exploitation of the rich water power resources (Table 6).

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The plants, some of which are still under construction, will soon cover the state's requirements; the completion of the Tauern power plant at Glockner-Kaprun will materially contribute to Austria's power supply.

Less than one-tenth of the surface area is arable land (Table 4); it is located mostly in the Flachgau area and in the Salzburg Basin. The mostly narrow valley floors in the interior of the state permit intensive grain cultivation only in a few places; bread grains must therefore be imported. Large areas are covered with field grass. Two-fifths of the surface area are covered with meadows and pastures. Cattle breeding is significant, though on a smaller scale than in Tirol. In 1952 there were 43 head of cattle per 100 inhabitants.

The forests of the state furnish the basis for the main branches of Salzburg's industries, i. e., the sawmill industry (46% of Salzburg's industrial enterprises, employing only 10% of all employed people) and the wood processing enterprises.

The sawmill industry is concentrated in the Pongau and Pinzgau areas. Here we find the largest commercial sawmills which export a considerable portion of their products. The wood processing enterprises produced high quality finished products, such as modern toys, accessories and tools for the textile industry, furniture, and prefabricated wooden houses.

All types of textile industry are represented in the state (wool, cotton, silk, Loden cloth).

The number of looms has more than doubled compared to 1938 (new establishments). The clothing industry supplies the domestic and foreign market (Loden cloth products).

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A plant for the production of flat glass has recently been set up in Mitterberg, S of Bischofshofen, where there are also other glassworks. With the 270% increase in the number of industrial employees compared to 1938, the state is now at the head of the other federal states in this respect. Its contribution to Austria's overall industry amounts to 4%. The more than 700 industrial plants of the state employ more than 120,000 blue and white collar workers.

Tourist trade is of great importance. Salzburg is the typical tourist state of the Austrian and Central European areas. Its attractiveness (festivals, cultural and natural treasures, winter sports, mineral springs) as far as the Old and New World are concerned also contributes much to the prosperity of the neighboring areas within and outside Austria.

IV. Government and Population

In addition to the city of Salzburg, the state is subdivided into 5 administrative districts: Salzburg area, Hallein, St. Johann in Pongau, Tamsweg, and Zell am See.

The 4 cities of Salzburg, Hallein, Radstadt, and Zell am See house one-fourth of the population; the 25 market communities house one-sixth of the population; more than 50% live in scattered settlements; as to farmhouse types, we find the grouped compound in the S and W; the single-unit farmhouse predominates only in the N (Lofer area and Flachgau Valley).

About 7% of the population live at elevations of 1,000 m or higher..

The dialect of the population mainly belongs to the Middle Bavarian group; in the Lungau area it is South Bavarian.

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BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

Employed people	Farming Forestry	Industry Trades	Business Transportation	Professional People
153,000 [A]	31%	38%	15%	6%
Occupational Subdivision of the Population [B]	22%	35%	14%	4%

	Civil Service	Domestic Service	Unemployed	Unknown
[A]	5%	3%	-	2%
[B]	5%	2%	12%	6%

Compare and compile:

The mining areas (Table 5). Important power plants (Table 6). The most important industries of the state. Prepare a sketch of the Lungau area with its passes.

Carinthia

Area: 9,530 sq km; population: 474,700 (1934: 405,100); relative population density: 50 (Table 10).

I. Location (map exercise)

Railroad connections between the place where your school is located and Klagenfurt, Villach. Boundaries which follow the divides. Neighboring countries and states adjoining Carinthia. Alpine mountain groups in Carinthia. Which of these form the boundaries? Border passes. Geological structure (cf. map in atlas).

II. State Sections

Carinthia consists of the following: (1) Upper Carinthia in the W, mountainous and extending to the confluence of the Drau and Gail rivers; (2) Lower Carinthia, including the Klagenfurt Basin and its surrounding areas.

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1. Upper Carinthia

(a) The Drau Valley. The Drau River enters Carinthia via the Tirol Gate above Oberdrauburg. Here the valley floor is wider than in East Tirol. There are large settlements and extensive fields on all alluvial cones which enter from the N and are therefore situated on the sunny side; the valley floor is partially swampy and covered with floodplain meadows.

From the Tirol Gate to the Sachsenburg narrows, the valley is called the "Upper Drau Valley." From this point it continues toward E into the wide, sun-drenched, and fertile Lurn Plain, the alluvial cone deposited by the Lieser River; this plain is accompanied on both sides by broad terraces at elevations of 800-900 m. Settlements can be found on the sunny side at rather high elevations; the shady side is covered with forests. The high summer temperatures favor the cultivation of maize.

A road winds its way from the market community of Oberdrauburg via Gailberg saddle (982 m) to Koetschach and Mauthen in the Gail Valley and on to Italy (Udine) via Ploecken Pass. This lateral connection link follows the route of the old Roman road from Aquileia to Iuvavum. Leaving Markt Greifenburg (sheepwool factory), we arrive at long and narrow Lake Weissen (area: 6.8 sq km, depth: 97 m) whose summertime water temperature rises to 23°. Near Techendorf a bridge crosses the lake to the S shore. The drainage river of the lake runs into the Drau River near Paternion. The city of Spittal on the Drau (population 8,700; lumber industry, mineral springs, feldspar mining) lies in a tectonic depression whose edges and terraces are well cultivated and densely settled. This is the junction point of the Katschberg road, the Tauern railroad, and the rail line coming from

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Franzensfeste. The old Roman settlement Teurnia used to stand NW of Spittal, near St. Peter im Holz. The part of the Drau Valley between Spittal and Villach is called the Lower Drau Valley.

(b) The Moell Valley. This valley belongs to the irregular network of valleys on the S side of the Tauern Mountains. The valley frequently changes direction at acute angles. In the upper section, on the sunny side which in this case is the leeward side of the Tauern Mountains at the same time, we find cultivation and settlements up to elevations of 1,680 m due to the favorable climate. In the Lower Moell Valley we find maize and much fruit cultivation. Despite the extensive Alpine pastures, the Alpine dairy economy is not significant.

The Tauern railroad leads from Spittal into the Lower Moell Valley; it soon leaves the valley floor and negotiates the high valley step of the Mallnitz Valley over a steep gradient with many tunnels and curves near Obervellach. The market community of Obervellach (686 m; population 2,400; cattle market, wood industry) is connected with the 360 m higher situated railroad station by a cable car. At the mouth of the Mallnitz Valley lies the railroad power plant of Obervellach (Mallnitz Creek) and on the southern exit of the Tauern tunnel we find the village of Mallnitz (1,192 m; winter sports and summer resort, starting point for trips to the Ankogel and Goldberg mountain groups). The main road continues in the Moell Valley and meets the southern continuation of the Grossglockner Alpine road in Winklern. Heiligenblut is situated on a rock ledge of the Moell Valley at an elevation of 1,288 m. Although field cultivation extends up to 1,600 m elevation, the Moell Valley is rather thinly settled. The settlement type here is the single-unit house with the entrace on the longitudinal side.

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(c) The Lieser Valley. This valley joins the Drau Valley near Spittal. It is very sunny and warm; for this reason the cereal lineis to be found at 1,500 m.

The comparatively dense settlement of the Lieser Valley was given further impetus by the ferrilyte mining activities of olden days in the area around Gmuend and Innerkrems (eastern side valley).

N of Spittal the Lieser River receives the drainage river of 12 km long Lake Millstaetter (area: 13.3 sq km; depth: 141 m) which is situated in a basin running parallel to the Drau Valley. This lake is frequented by many foreign visitors because of the high summertime temperatures of its water (21-22° C). The principal settlement is the market community of Millstatt which owes its origin to the no longer existing eleventh century Benedictine monastery. There is a road running from Millstatt via Radenthein (magnesite plant) and on via a col to Feld on Lake Brenn and to Villach along Lake Afritz. In a wide section of the Lieser Valley lies the walled city of Gmuend (wood industry). Here branches off the Malta Valley with its main waterfalls and gorges; the trail to Arlscharte in the Grossarl Valley follows the Malta Valley. In the upper Lieser Valley we find Rennweg (1,141 m) where we meet the road which runs into the Lungau Valley via Katschberg Pass (1,641 m).

(d) The Gail Valley. This valley runs along a remarkably straight line (line of disturbance) from Kartitsch saddle to Villacher Alpe (Dobratsch) between the Gailtaler Alps in the N and the Carnic main chain in the S (Photo 35). The uppermost part up to Koetschach-Mauthen, called the Lesach Valley, is a narrow and in places even impassable gorge cut into the crystalline rock. The settlements and trails in this rough, snow-rich part of the valley are found on the sunnyside slope 300 m above the Gail River.

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The valley floor widens after Koetschach and Mauthen (wood industry; end of the Gail Valley railroad; it is rather swampy (horse breeding) there, as it is in the depression of Lake Pressegger. Drainage projects fail to produce permanent results probably because the valley floor keeps sinking. The settlements are located on the terraces and alluvial cones; on the sunny slopes abundant fields and farms are found up to 1,200 m.

N of Koetschach stands the Laas tuberculosis sanatorium. Hermager (population 1,600; wood industry, gypsum plant, lumber and cattle market, heating and cooking equipment plant) also lies on the lateral connecting link which runs through the Gitsch Valley via Kreuzberg saddle (1,077 m) into the Drau Valley and to Greifenburg.

The lower part of the Gail Valley, starting at Hermagor, is accompanied by gravel terraces. Maize covers 15% of the arable land and constitutes an important food item. Landslides from Villacher Alpe covered the valley floor further at the foot of the Alpe.

The Gail and Gailitz wind their way through the block hills in narrow channels. The major part of the downfaulted material dates back to the Interglacial; the landslide in historic times (1348) was of smaller dimensions but managed to destroy a number of settlements.

The starting point of the Gail Valley railroad is found at the market community of Arnoldstein (population 5,300); in the village of Gailitz, which belongs to this community, we find the processing plants of the Bleiberger Mining Combine (lead and zinc smelter; production of molybdenum line, lead dyes, lithopone, sulfuric acid, and other chemicals). On the N and W foot of the heavily wooded Villacher Alpe (2,166 m) stand the settlements of Bleiberg, Kreuth, and Noetsch which

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together form the market community of Bleiberg ob Villach (population 3,700). This community owes its existence to the lead and zinc deposits in the "ore mountain" located to the N. At Bleiberg-Kreuth we find Austria's most important galena deposits which also contain some molybdenum. In the winter Bleiberg gets no direct sunshine at all for 2 1/2 months.

2. Lower Carinthia

(a) The Klagenfurt Basin. This area extends E of Villacher Alpe; it is 75 km long, 20-30 km wide, and is thus the largest basin of the East Alps. It is filled with field and forest covered mountain and hill groups which are as high as 1,076 m. Only the small Zoll Field is a plain (photos 31, 33).

The Klagenfurt Basin is not a geosynclinal basin; it was the upward movement of the rim areas which created the basin formation; the interior maintained its position during the uplifting process. The northern edge, the Central Alps, generally rose vertically, while the southern cutoff took the form of the Karawanken wall only when this area became a mountain region for the first time, mainly through horizontal movements (nappe formation) during the Middle Miocene.

The mountain and hill groups originated partly in the basal complex, such as the limestone cone of the fortress hill of Hochosterwitz, partly in Tertiary gravel deposits, such as the Sattnitz area (600-900 m), and partly in moraine walls of the tripartite Drau glacier. The latter caused the development of the present day valley network and the formation of lakes; these are located partly in the scooping basins, such as Lake Ossiacher and Lake Woerther, and partly they are damming lakes, such as lakes Faaker, Keutschacher, and Klopeiner (Photo 2). In the southern furrow of the Drau glacier, between the Sattnitz and the Karawanken Mountains, in the Rosen Valley, flows the Drau River today (Photo 3).

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The Glan, Vellach, and Gurk rivers, which were pushed to the outer edge of the glaciated area by moraines, used to flow to the lower situated center after the withdrawal of the ice; for this reason they follow an oddly crooked course.

Lake Ossiacher (length: 11 km, area: 10.6 sq km, depth: 46 m) is a warm lake for bathing; a cable car runs to Kanzelhoehe Mountain (1,489 m) from the N shore (Annenheim). There are 2 chair-lifts up Mt. Gerlitzen (1,090 m; wonderful view).

The upper Glan Valley (main settlement: city of Feldkirchen, population 3,000) is the route of the Villach -- St. Veit-on-the-Glan rail line.

Lake Woerther (length: 17 km, width: one to 2 km, area: 19.4 sq km, depth: 85 m) has a rather small tributary which also influences the summer temperature of the surface water (July to August, 24-28° C). Its discharge is the Glanfurt; the 4 km long Lend Canal is an artificial discharge which establishes the connection with Klagenfurt. The following are highly popular bathing resorts on the N shore: Krumpendorf, Poertschach; on the W shore: Velden, an international Alpine lake bathing resort (Lake Woerther sports festival); on the S shore: Maria Woerth, situated on a peninsula which divides the lake into 2 basins, and Reifnitz. On the E shore the city of Klagenfurt owns a modern beach bathing resort.

The landscape of the Klagenfurt Basin is extremely varied -- more so than any other basin in the East Alps -- by virtue of the high mountains in the N and S, the mountain and hill country, and the many lakes in the interior.

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The climate of the Klagenfurt Basin reaches extremes. It is very hot and dry in the summer and there are many thunderstorms; the winter is very severe due to the temperature inversions in the depression.

Klagenfurt's winter temperatures drop as low as -- 20° C. The temperature inversion causes the January temperatures on the edge of the Krapp Field to rise regularly up to an elevation of 1,200 m. The temperature drops normally again at this elevation. In the interior of the basin it is as cold as at elevations of 1,750 m at the same time.

The high summer temperatures (July average: 19.2), the relative dryness (880-1,000 mm) and the effect of the south foehn (Jauk) make for good arable soil and rich cultivation. The fertile moraine soil supports field cultivation. The level gravel surfaces in the W are dry at the foot of the Karawanken Mountains (limestone rubble) and wooded; mostly however they are covered with loam soil (field cultivation). More than a third of the area in the W and half the area in the E are grain growing land. The main crops are wheat and maize; buckwheat is secondary. The foehn favors the cultivation of fruit throughout the basin and some vineyards S of Voelkermarkt. Forests cover the mountains and gravel surfaces. The meadows of the damp soils favor horse breeding; despite the great distances involved, cattle are driven into the mountains in the summer.

The northern part of the basin is populated by German-speaking people, the southern part by Slovenes. The population density is 75 on fertile soil areas; otherwise it is 40-50. The Sattnitz area on the other hand is almost empty.

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The settlements avoid the cold wintertime soil of the basin. The imposing individual settlements (grouped compounds) stand on the sunny terraces; compact settlements are found only on the gravel flats and on the edges of the basin.

Industry, which uses the water resources at the edge of the mountains, is confined to wood processing in sawmills and paper factories. All that is left of the formerly thriving iron industry are plants in Ferlach (iron and steel products, hunting rifles), Villach, and Klagenfurt.

The basin is the junction of important transportation routes: Villach, Klagenfurt, and St. Veit-on-the-Glan are traffic hubs.

Villach (population 30,000), located above the place where the Gail joins the Drau, is Carinthia's second largest city and one of Austria's most important traffic hubs.

Traffic from Italy divides into 2 branches at this point; one line runs to Vienna via the so-called "diagonal passage," via Neumarkt saddle, and Mt. Semmering; the other line leads to Salzburg and Munich via the Tauern railroad and/or the Grossglockner Alpine road. Villach is the main storage site for lumber being shipped to Italy. It has wood industry installations and a cardboard factory, metal industry, chemical industry, and fruit processing.

The settlement existed at the time of the Romans who used the hot springs at Villach (Villa ad aquas -- Villach warm springs). The appearance of the hot springs (29°) is caused by the junction of several lateral disturbances in the Villach area (earthquake zone).

Klagenfurt (446 m, population 62,700) is the state capital; it is the economic center of the basin and lies in the middle of the

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plain at the intersection of the routes coming from W and E -- the Villach -- Unterdrauburg rail line and the N-S route from Neumarkt saddle to Loibl Pass and to the Karawanken railroad (Rosenbach) (Photo 31).

The city replaced St. Veit-on-the-Glan as state capital in 1518 and is the seat of the state legislature, the state government, and the bishop of Gurk. It was founded at the end of the twelfth century. There is little left of the medieval part of the city since the city suffered great fires several times. Numerous neighboring communities were incorporated into the settled area, e. g., the city of Sankt Ruprecht, the villages of St. Peter, St. Martin, Annabichl (56 sq km). The airport is at Annabichl.

The local industry produces white lead, matches, leather and shoes, and machines and processes wood.

The road to the S leads to Yugoslavia via Loibl Pass (1,368 m; road built in 1717). Rosenbach is the junction of the railroad lines from Klagenfurt via Feistritz in Rosen Valley (generator plant) and from Villach via Faak am See. Rosenbach is the frontier station of the Karawanken railroad (8 km long basal tunnel, connection with Laibach and Triest). The railroad runs through the Jaun Valley (see note) on the Klagenfurt -- Unterdrauburg stretch S of the Drau (from Kuehnsdorf to the Austrian frontier station at Bleiberg). In the midst of the undulating terrain of the frontal moraines N of the Drau, on a terrace, lies the former iron storage center of Voelkermarkt (population 3,500), a highway hub on the road into the Lavant Valley and to the Packer mountain road (Klagenfurt -- Graz). ([Note] The Jaun Valley, also called Jaun Field, is a part of the flat area of the southeastern part of the Klagenfurt Basin extending from the Drau to the Karawanken. The name goes back to the Roman settlement called Iuenna.)

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From the station at Voelkermarkt-Kuehnsdorf, there is a branch line turning off to Eisenkappel to the S of which lies Vellach (850 m, mineral springs) in a beautiful heavily wooded region on the northern foot of the Steiner Alps. The Vellach Valley road leads into the Save Valley and Yugoslavia (old iron shipment road) via Seeberg saddle (1,218 m).

From Klagenfurt the main railroad line first runs N through the Zoll Field plain at whose southern edge lies the pilgrimage town of Maria Saal. The Zoll Field is a long valley plain of the Glan River (10 km) which is partly swampy. Here used to stand the Roman settlement Virunum, the capital of the Roman province of Noricum. The "duke's chair" on the road near Maria Saal was made of Roman stones. Many relics dating back to prehistoric times (Celtic settlement) were found on Mt. Magdalensberg NE of Maria Saal.

The Villach -- Lake Ossiacher -- Feldkirchen line joins the main rail line at St. Veit-on-the-Glan station. The latter locality owes its former importance to its location at a valley intersection point and junction point of long-distance transportation routes (Neumarkt saddle -- Venice). Today it is Carinthia's third-largest city (population 9,200; cloth manufacture, food production) and lies in a fertile region. E of the city, on a limestone cone, towers Ft. Hochosterwitz, the state's most beautiful fortress (Photo 33).

A branch line turns off at Launsdorf station and runs into the Goerschitz Valley to the mining village of Huettenberg (iron ore mining). The main railroad line runs through the broad valley plain of the Gurk River, which is the densely settled and heavily cultivated

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Krapp Field; large individual farm compounds and villages are interspersed between orchards and clumps of woods. S of the point where the Metnitz runs into the Gurk lies the market community of Althofen (mud baths) which is combined with Treibach (chemical plant) on the valley floor. The main settlements of the upper Gurk Valley are the city of Strassburg (former bishop's castle, largest ruins of the state, mineral springs, wood pulp plant) and the market communities of Gurk and Weitensfeld.

Gurk (population 1,000) used to be the seat of a bishop (today Klagenfurt); its cathedral is one of Austria's most important Romanesque edifices. The municipal area of Strassburg (population 3,100) also includes 5 villages and 41 subhamlets.

From the uppermost Gurk Valley there are roads leading via Feldkirchen to the Glan Valley and via Turracher Heights (1,763 m; Lake Turracher, anthracite mining) into the upper Mur Valley.

The main railroad line follows the wide section of the Metnitz Valley to the old walled city of Friesach (population 3,400; retting pit, tannery) with its many castles. It used to be a main rest center and storage site on the route to Italy. The Gurk and Metnitz valleys offer access into the Gurktaler Alps whose western part ("Nock area") is a well-known winter sports region (Photo 30).

The large surfaces on the heights, especially in the W, constitute good Alpine pastures ("Almgau" area, only 35% forest) where the cattle are driven from the Klagenfurt Basin. On the sunny slopes the fields extend as high as 1,310 m and in places even as high as 1,560 m or higher. In the eastern part, which is lower, the forests take up more space ("Waldgau" area, 55% forest).

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Individual farms, bunched villages, and far-spaced road villages in the valley predominate in this region. The church villages are situated mostly on the heights. Carinthia's highest village is St. Lorenzen in the upper Gurk Valley (1,472 m); the highest permanent settlement is the hamlet Hintere Axten in the Moell Valley (1,720 m).

(b) The Levant Valley. This valley lies between Saualpe in the W, Packalpe and Koralpe in the E, opens toward S into the Drau Valley (Lavamuend), and is connected in the N with the Mur Valley by a road and railroad running via Obdacher saddle (945 m). Recent crust movements contributed to the development of the valley; this is borne out by the presence of isolated basalt cones near Kollnitz (NW of St. Paul) (see note), the Saeuerling hill at Preblau, and the sulfur baths of the municipality of Bad St. Leonhard. ([Note] The basalt deposits in this region belong to the series of Young Tertiary volcanic breakthroughs in eastern Styria; this is the only deposit in the Alps.)

Near Wolfsberg begins an almost 20 km long and 6 km wide basin which is filled with young ocean deposits and the fine sand of a glacial lake which was stored up by the gravel of the Drau.

In the basin we also find large brown coal, deposits, partly explored only in recent times, which are now being mined with the most modern equipment particularly in the area of St. Stefan. A portion of the coal, which is not of high quality, is being used in the large new steam power plant at St. Andrae. Nearby there is also biotite mine (operations discontinued in 1953).

The upper Lavant Valley is rich in woods and meadows and supports a major animal husbandry effert (Lavant Valley breed or blond

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cattle). The population speaks a Styrian dialect. The Wolfsberg Basin is very fertile; due to the high summer temperature this is ideal wheat and fruit growing country.

The most important communities are the city of St. Andrae (population 1,700; seat of the prince-bishops of Lavant from 1288-1859, today in Marburg on the Drau), the market community of St. Pauli (basalt plant) with the Benedictine Abbey founded in 1091, and the city of Wolfsberg (population 8,000; scythe, leather, and paper production) which is the main settlement.

The Zeltweg -- Unterdrauburg rail line runs into the Lavant Valley; due to the loss of Unterdrauburg it has lost some of its importance however. The Pack road, opened in 1936, is all the more important (pass heights at 1,166 m); this is a broad, modern motor highway which follows old trade routes (pack horse trails). It is the shortest connection between Graz and Klagenfurt.

III. Economy

Carinthia was and is rich in natural resources (Table 5).

The ore deposits can be divided into 3 zones: gold in the Hohe Tauern Mountains and their spurs; many iron ore deposits in the mountains between the Lieser and Lavant valleys; and a lead and zinc ore zone in the Gailtaler Alps and in the Karawanken Mountains. In the course of the centuries gold mining was replaced with iron ore mining, which in turn was displaced by lead and zinc mining. As late as during the middle of the nineteenth century almost 10% of the population of Carinthia lived off iron ore mining.

Today iron ore is being mined only at Huettenberg and in Styria. The center of the lead and zinc mining area is the Bleiberg -- Kreuth region.

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Brown coal mining (Lavant Valley) is also of significance; so are magnesite mining whose rich deposits on the NE slope of Millstaetter Alpe were still unknown at the turn of the century; antimony (Rabant, NW of Oberdrauburg, discontinued in 1953); talcum (S of Friesach) and feldspar (Spittal on the Drau). Cement and durite (roofing) are being produced in the Goerschitz Valley (Wietersdorf and Hornburg).

The annual income from mining and the enterprises of the stone and ceramics (brick) industry is estimated at roughly one-quarter of the total value of Carinthia's industrial products.

The state has more than a dozen mineral springs of which, however, only the hot springs at Warmbad Villach and the sulfur springs at Bad St. Leonhard are better known. Preblau ships mineral water.

The descending order of surface magnitude of forest, grass, and arable areas (Table 3) also arranges the various branches of agriculture according to their relative importance in the following order: forest economy, animal husbandry, agriculture.

Carinthia is second only to Styria with respect to forested areas.

More than 90% of the forests are evergreens. The cembra pine, of which there are major forests in the Gurktaler Alps, is widely used as building lumber.

Meadows, pastures, and Alpine pastures take up roughly one-third of the surface area and thus form the basis for animal husbandry.

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First place is taken by cattle breeding. The most frequent are the milk cattle of the "Pinzgau breed" (also called "Moell Valley breed" in the state) and the "Carinthian blond cattle" ("Lavant Valley breed"). In 1952 there were 40 head of cattle per 100 inhabitants. In the northern sections of the state, where often more than 50% of the area are grassland, there are 100 to 150 head of cattle per 100 inhabitants. In the Klagenfurt Basin the effort is concentrated on cattle for breeding; in the rim areas it is concentrated on cattle for slaughter.

Carinthia produces more beef and breeding cattle than it needs and therefore exports the surplus. As for the dairy industry, Carinthia is behind the other Alpine states (e. g., Tirol).

Of the actual Alpine states of Austria, Carinthia has the greatest percentage of arable soil.

Rye is favored; then comes oats, wheat, and, on the best soil, barley. Maize is grown mostly in the low areas which are warm in the summer. Early harvests in some sections of the state make it possible to grow buckwheat as second crop.

The grain fields are found chiefly in the Klagenfurt Basin and in the bays along its edges (Krapp Field, Lavant Valley), although the crops do not cover the needs of the state in this respect.

Fruit cultivation is being pushed. Two-thirds of the pit fruit crop are destined for eating.

A major portion of the local fruit crop (including berries in the woods) is turned into marmalade at St. Ruprecht near Villach and in Maria Saal.

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The number of people employed in agriculture and forestry has been reduced by more than 50% since 1890 (1890: 64%, 1951: 28%).

Carinthia has good possibilities for the development of its water power plants (Table 6). The largest plants in the state are the Drau power plants (Schwabegg, Lavamuend) which in recent years produced about one-third of the power volume of the Austrian network (Photo 37).

A railroad power plant is located near Obervellach. A few older plants use the water of the Gail (Gail power plant) and the Gurk (Rain power plant, W of Klagenfurt). There are many power exploitation possibilities in the rivers coming from the Tauern Mountains. A large power plant is under construction in Kolbnitz (on the Tauern railroad) which is expected to have a capacity of one-third of the Glockner-Kaprun plant) and which will use several lakes and drainages from the Kreuzeck and Reisseck groups. A large steam power plant is under construction in St. Andrae in combination with the coal deposits there.

The power surplus is used by several enterprises in chemical processes, e. g., the chemical plant in Treibach (cerium iron, invented by Auer von Welsbach, iron alloys, corundum), in Weissenstein near Paternion (hydrogen peroxide), and in Brueckl W of St. Veit (chlorine, caustic soda).

Only a few plants are left to remind us of the once flowering steel and iron industry.

These include the plants in Ferlach, Villach, Klagenfurt, and Strassburg ("Jergitsch" wire fences); scythe and sickle plants are located in Himmelberg (NW of Feldkirchen), Wolfsberg and Kleingoeditz;

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there is a chain plant in Brueckl. Ferlach, once one of Austria's armament production centers (eighteenth century) is still famous for its hunting rifle production.

The magnesite deposits in Radenthein were responsible for the development of Carinthia's largest industrial enterprise whose products (fireproof brick and stone, magnesite meal) are shipped to all parts of the world. In Ferndorf near Paternion the enterprise produces "Heraklith" plates, a construction material consisting of wood fiber, magnesite, and calcium chloride; in Millstatt it produces fireproof ovens for the iron industry. The plant of the Bleiberger Mining Combine, which is under construction, will be Carinthia's second largest industrial installation; it produces lead, zinc, sulfur, and some molybdenum lime at Arnoldstein-Gailitz; lead and sulfur are being processed here, in Klagenfurt, and in Saag on Lake Woerther. There is a generator plant in Feistritz i. R.

About 30% of the total value of the industrial product are based on lumber.

Lumber is cut partly in more than 750 mills, and it is processed partly in paper and cellulose mills which represent more than a quarter of all Austrian industrial enterprises. The largest installations are located in the Lavant Valley (Frantschach, N of Wolfsberg) and in the Vellach Valley (Rechberg). The products of the sawmill, paper, and cellulose industries are exported to a great extent.

Fir tree bark is used as raw material by many tanneries; the largest of these is located in Klagenfurt. The waste products of the sawmills are used by the wood fiberboard plant in Kuehnsdorf which makes modern materials for the furniture industry.

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The number of employed in trade and industry has increased by 200% over 1938.

The requirements for tourist trade are present to a great extent. The main centers of summer tourist traffic are the many lakes.

IV. Government and Population (Table 10)

Carinthia is divided into 9 administrative districts: 2 municipal districts (Klagenfurt and Villach) and 7 rural districts (Klagenfurt area, Villach area, St. Veit, Spittal on the Drau, Hermagor, Wolfsberg, Voelkermarkt). One-fourth of the population lives in the 16 cities; one-seventh lives in the 31 market communities; more than half lives in the villages, hamlets, and individual farmsteads whose main types are the bunched village and the bunched compound, respectively. About 4% of the population live at elevations of 1,000 m or higher.

In 1951 94% of the resident population of Carinthia registered as German-speaking and 5% as Slovenians (about 22,500).

Most of the Slovenians live in mixed language communities. The mixed language area in general is to be found in the area S of the Gail --- Drau line from Hermagor to the eastern state boundary, but it also spills over the general language boundary into the northern part here and there. Of the 90 communities in the mixed language area only about 10% have a Slovene majority (Rosen Valley, Karawanken valleys, Jaun Field). More than half of the Slovenes live in communities with a German-speaking majority.

There are also many German-speaking clusters in the mixed language area. The German-speaking area juts out over the transportation

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routes leading S (Villach -- Gailitz Valley, Klagenfurt -- Loibl road, lower Lavant Valley). There is no compact Slovene language area -- only a compact mixed area with predominantly German-speaking population. The Slovenes enjoy exemplary minority protection: there are bilingual schools, church language, cultural facilities, etc.

The natural and peaceful coexistence of the 2 nationalities led to a common culture and a common destiny.

The dialect of the German-speaking population belongs to the South Bavarian group.

BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

Employed People	Farming Forestry	Industry Trades	Business Transportation
215,000 [A]	38%	37%	12%
Occupational Subdivision of the Population [B]	25%	35%	12%

	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
[A]	4%	4%	3%	-	2%
[B]	4%	4%	2%	13%	5%

Compare and compile:

Parts of Austria in which, as in the Klagenfurt Basin, there may be temperature inversions (cf. temperature map in the atlas). The state's natural resources which are being exploited -- other federal states in which these resources are being exploited; compare quantities (Table 4). The percentage increase of the population from 1934 to 1951. Main transportation routes (railroads and highways) running through Carinthia; transportation hubs. Factors favoring the state's tourist trade.

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Styria

Area: 16,380 sq km; population: 1,109,600 (1934: 1,015,100); relative population density: 68 (Table 10).

I. Location (map exercise)

Parts of the Alps represented in Styria. Rivers draining the state. Passes leading into neighboring countries and states. Railroads leading from the place where your school is located to Graz. Geological structure (cf. map in atlas).

II. State Sections

1. Upper Styria (Upper Land)

Upper Styria includes the area of the state W of the Fischbacher Alps, the Stubalpe, and the Gleinalpe.

(a) The Styrian Salzkammergut Area. This area includes the source of the Traun River and the Mitterndorf col, the Totes Gebirge Mountains, Mt. Grimming, the Kammer Mountains, the eastern part of the Mt. Dachstein group, and the small landscape parts. Forests, growing up to elevations of 1,700 m, cover most of the area. The Styrian Salzkammergut area has heavy snowfall in the winter (winter sports); the summers are cool and damp (Altaussee, 950 m, 2,170 mm precipitation). The main occupations of the population are lumbering, salt mining, and tourist trade. In the Aussee Basin, at the junction of 5 valleys, lies the market community of Bad Aussee (population 5,400, salt mine, weaving plant, chemical products); on the western end of the lake with the same name lies the village of Altaussee.

Bad Aussee owes its origin to the salt mining operations on the eastern slope of Mt. Sandling. The healing waters of the

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saline spring are used for therapeutic purposes. The road winds its way via Poetschen Pass (982 m); the railroad runs up the Traun Valley. Both come from the Upper Austrian Salzkammergut area through the basin, cross the Salza which flows to the Enns in Mitterndorf (hot springs) and join the transportation routes in the Enns Valley at Stainach-Irdning.

(b) The Upper Enns Valley. Like the Salzach Valley, the Enns Valley is probably also of tectonic origin; this is borne out by the straight line described by the valley. The valley formations are likewise influenced by the effects of the ice age.

The river enters Styria via the narrows of Mandling Pass (810 m). The valley narrows are based on Triassic dolomite. On Styrian soil the Enns flows in a widening glacial trough on whose valley floor we find large alluvial cones of the creeks coming from the side. On the left bank, on the southern slope of the Mt. Dachstein Massif, rises the Ramsau rock terrace, covered with mightly diluvial deposits. A little further down the slopes of Mt. Grimming move closer to the valley floor which is very swampy from Irdning to Admont; it is covered in many places with peat bog which are 40 m deep near Liezen. The valley floor is considered a tonguelike basin of the Enns glacier which pushed its branches northward via Pyhrn Pass, via Buchauer saddle, and south into the Palten Valley. In the upper part the valley floor is covered with many meadows; the fields are mostly situated on the alluvial cones and the slope steps.

The vegetation is different on the 2 sides of the valley. On the N side (Limestone Alps) the forests extend up to 1,750 m, on the crystalline of the S side up to 1,900 m. Agriculture covers more than one-eighth and meadows and pastures take up more than one-fifth

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of the surface area. In the middle Enns Valley winter wheat reaches up to 920 m elevation; summer wheat is found in sunny spots as high as 1,200 m and over. The house type is the Interior Austrian bunched compound; W of Schladming we find the Upper Austrian and Salzburg single-unit house.

The upper Enns Valley is thinly settled. The city of Schladming (population 2,700; sawmills, Loden cloth, woolens, and veterinary medication production) used to be the center of a lively medieval mining region (silver, lead, and copper) and is today a much frequented summer resort, a well-known winter sports area, and the starting point for mountain tours into the Niedere Tauern Mountains and the Mt. Dachstein area. A road leads into the climatically favored Ramsau area which is protected in the N by the walls of Mt. Dachstein. On a terrace we find the market community of Groebming (tannery, hand weaving plants, cheese factory); like Groebming, Haus and Oeblarn are also places from which one can start hikes into the Niedere Tauer Mountains.

Between Stainach and Liezen (population 4,800; iron and steel plant, ceramics, sawmill) lies the sulfur bath of Woerschach. Stainach-Irdning and Selztal are railroad hubs.

From Selztal the road and railroad run S via Schober Pass to St. Michael and into the Mur Valley; to the N the Pyhrn railroad line (Bosruck tunnel, 4.8 km long) established connection with Linz. The road via Pyhrn Pass (945 m) into the Steyr Valley branches off in Liezen.

Before the broad Enns Valley narrows to the Gesaeuse Gorge, we find on the right bank, on a slope step, the market community of Admont (population 3,700) with the historic Benedictine abbey (founded 1074).

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(c) The Gesaeuse Gorge. This gorge begins E of Admont and extends to Hieflau. It constitutes a 16 km long section of the Enns Valley and represents a canyon in Triassic limestone which is indicated tectonically. There is enough room for a railroad line and a road in this gorge (Photo 38).

To the S opens the Johns Creek Valley, a wild and romantic gorge separating Mt. Reichenstein (2,247 m) and the Hochtor Chain (Mt. Hochtor, 2,372 m; Mt. Planspitze, 2,117 m). The northern end of the Gesaeuse Gorge is closed off by Mt. Grosser Buchstein (2,224 m) and Mt. Tamischbachturm (2,035 m). The narrow valley floor leaves barely enough room for the river, the road, and the railroad and is almost uninhabited. The winters are severe and there is heavy snowfall. Gstatterboden and Johnsbach are starting points for climbing expeditions. From Admont there is a road skirting the formerly impassable Gesaeuse Gorge (rockslides, floods) and leading NE via Buchauer saddle (858 m) to the market community of St. Gallen (cattle market) and on into the Enns Valley and Altenmarkt.

At the eastern exit of the Gesaeuse Gorge, in a valley cirque, lies Hieflau (population 1,900),once an important upper Styrian iron processing center.

Below Hieflau the Enns Valley also dips into the limestone zone; the various hard rock types cause an alternation of wide and narrow valley sections.

(d) The Eisenerz Alps and Mt. Erzberg. From Hieflau the railroad and road run through the Erz Creek Valley to Eisenerz (population 12,900) and via Mt. Praebichl (1,227 m) to Vordernberg into the wide and well-settled basin of Troifach and to Donawitz and Leoben into the Mur Valley.

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The Eisenerz Alps, SE of the Gesaeuse mountains between the Rottenmanner Tauern Mountains and the Hochschwab Range, consist of slate and limestone of the graywacke zone which are rich in natural resources (iron, copper ore, graphite, talcum, magnesite). In the E we find gently dipping ridges where field cultivation extends as high as 1,200 and 1,300 m on the sunny side. The rougher western part with its sharp ridges and steep slopes is heavily wooded and covered with pastures.

The ore riches of Styria's Mt. Erzberg were known to the early Tauriscians. The first written reference to iron mining dates back to 712 A. D. The most important settlements which sprang up here were the city of Eisenerz ("Inner dem Berg" [in the mountain]) and the market community of Vordernberg ("Vor dem Berg" [before the mountain]). Near Eisenerz lies picturesque Lake Leopoldsteiner. The ore deposits (Photo 39 and Figure 19) consist of old, poorly fossilized limestone of the Silurian-Devonian formation which during the Mesozoic were transformed partly into the bright yellow iron carbonate siderite or spathic ore as a result of the effect of iron containing solutions; the spathic ore in the open air gave off carbondioxide and changed into brown hematite which produces the red color of the mountain. Pit mining prevailed for a long time; today there is strip mining in the summer and below-ground mining in the winter. Spathic ore has about a 2% iron content and 2% manganese. The raw face, i. e., iron carbonates ("Ankerit") containing up to 15-20% metal, is put in mine dumps since at this time it cannot be processed profitably. Strip mining is done on many steps along the mountain slopes. Prior to smelting, the ore is roasted in a plant at the foot of the mountain in which connection the iron content is increased to 44-55%. The smelting is done in the blast furnaces of Donawitz and Linz (Photo 40).

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(e) The Mt. Hochschwab Area and the Mariazell Basin. The Mt. Hochschwab Range (Mt. Praebichl -- Seeberg saddle line) forms the continuation of the northern Limestone Alps to the NE and comes after the Gesaeuse mountains. This range has the character of a boss with individual summits (2,277 m) between which there are partly karsted, partly pasture and stunted-tree covered hollows and plains (dairying, hunting). The tree line runs at 1,500-1,600 m; pastures extend as high as 1,700 m.

The uppermost valley basin of the Salza shelters the old pilgrimage village of Mariazell (868 m; population 2,200) which is also a high altitude health resort and a winter sports site (cable car to Buergeralpe, 1,266 m). The Styrian-Lower Austrian state railroad terminates at Gusswerk. (Armaments center around 1800; today wood fiber and cardboard plant, sawmill industry). Near Mariazell the fields do not extend beyond 1,000 m; forestry (large holdings) is more important here than agriculture (Photo 41).

Several roads meet in this basin, including a road from Vienna via Tuernitz, Annaberg, Mitterbach; another road from Kernhof through the Walser Valley; another one from Neuberg via Frein and Lahn saddle (1,006 m); another one via Niederalpl (1,220 m); a road from Aflenz via Seeberg saddle (1,254 m), another one from the Salza Valley, and one from Lunz via Neuhaus saddle. Mt. Zellerhut, Mt. Hochkar, and Mt. Voralpe are key border peaks along the Styrian-Lower Austrian Alps.

The water of the abundant springs (karst springs) is being gathered in the area between Gusswerk and Wildalpen on the northern foot of the Mt. Hochschwab Range; this water is piped to Vienna (Second Vienna High Mountain Spring Water Pipeline). The abundance of springs is due to the presence of Werfen slate which lies under deeply cut limestone and dips N.

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(f) The Kammer Valley. The easiest connection between the Enns and Mur valleys is the depth-line Paltenbach -- Schober saddle -- Liesing. In the old days this valley line was called the "Kammer Valley" (Photo 42).

The wide valley floor and the gentle gradient made possible the construction of a road on which iron and salt used to be shipped. From here the "salt road" used to run from the Styrian Salzkammergut area into the Mur Valley. A branch leads via the Rottenmanner Tauern Mountain (1,265 m) into the Poelst Valley and to Judenburg. It follows the old Roman highway (Ovilava -- Virunum).

Due to the swampy soil of the valley the settlements had to be builtaalong the slopes, e. g., the city of Rottenmann (population 4,000; iron industry, sawmill), and Trieben, Wald, Kalwang, and Mautern.

The area S of the furrow of the Kammer Valley is also rich in natural resources. Graphite is mined near Kaisersberg (W of Sankt Michael) and Hohentauern; magnesite is mined near Kraubath on the Mur, S of Trieben and SW of Selzthal (Lassing); talcum is mined in Lassing and Mautern.

(g) The Upper Mur River Valley. The Mur enters Styrian soil through the narrows of Predlitz.

The long W-E furrow of the valley developed as a result of earth crust movements (geosynclines) through the lateral connection of valleys which originally used to run SE independently; this explains the alternation of wide and narrow valley sections.

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The upper part of the valley up to Judenburg is moderately wide. It is trough-shaped and reveals other glacial features (glacial boss near Nurau, step-like river mouths). The broad rubble cone terraces of the side creeks accompany the uniform valley. Before Judenburg we find the terminal moraine walls of the diluvial Mur glacier. Up to Unzmarkt meadows predominate on the valley floor and coniferous forests on the slopes. There are no major settlements. The individual farms are located on the sunny side up to 1,400 m. There is a narrow-gauge railroad, the Mur Valley line, in the valley (Unzmarkt -- Mauterndorf).

From Predlitz a road leads via Turracher Heights (1,763 m, "Nock area") to Carinthia. The railroad runs from Unzmarkt over the broad pass zone of Neumarkt saddle (888 m) which was scooped out by the Mur glacier moving through the soft mica schist. No other pass in the Central Alps is as low; this accounts for its great importance transportationwise since Roman days. It facilitates the so-called "diagonal passage" from Vienna to Venice. The road however runs over Perschauer saddle (1,005 m), which belongs to the pass zone of Neumarkt saddle and on into the Olsa Valley. The railroad and road meet on the S side in the market community of Neumarkt.

The chief settlement of the upper Mur Valley is the city of Murau (population 2,700). N of this place stands the "Stolzalpe" sanitarium (buildings at elevations between 1,100 and 1,300 m); W of Neumarkt stands the Benedictine abbey of St. Lambrecht (founded in 1103).

The most scenic section of the upper Mur Valley has many castles and extends from the mouth of the Katsch Valley to Unzmarkt (sawmill). Near Teuffenbach are the huge rock caves which contain the ruins of Lueg and Schallaun. A hollow runs from Tamsweg parallel

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to the upper Mur Valley; this hollow is crossed at its wide sections by tributaries of the Mur; it also contains a road which runs from the Lungau area to Morau via Seethaler saddle. The walled town of Oberwoelz (population 800) can be reached from Scheifling.

Between Unzmarkt and Judenburg lies Thalheim in whose Sauerbrunn Castle there is an alkaline earth sparkling mineral spring (mineral water export).

Near the city of Judenburg the Mur enters the Judenburg Basin whose northern part is called Aich Field; the southern part is called the Murboden area with its many meadows (animal breeding, Murboden breed of cattle). The basin, 20 km long and 8 km wide, is a geosyncline as is the smaller basin of Seckau. Along the edge of the basin in the Young Tertiary deposits we find anthracite seams near Fohnsdorf (population 11,100) which promoted the further growth of industry in the Mur Valley. The river is accompanied by mighty gravel terraces on which most of the settlements are located. The relatively mild and dry climate favors agriculture (rye and oats) despite the severe winters.

The city of Judenburg (population 9,800; Roman Idunum; steel plant, stone and sawmill industry) was an important trade center in the Middle Ages (Photo 43). The village community of Zeltweg (population 5,700) has iron industry and is the connection station of the railroad into the Lavant Valley.

The city of Knittelfeld (population 13,100) has important industrial installations (machine and metal products plants, scythe plant, lumber industry, main repair shop of the Federal Railroads). In the basin of Seckau we also find the market community and seminary

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of Seckau (founded in 1140 as Augustinian canon seminary, since 1218 seat of the bishop of the diocese of Seckau, cloister discontinued in 1782, bishopric moved to Graz; since 1883 owned by the Beuroner Benedictines).

The Mur Valley gets narrower between Kraubath and St. Michael (population 3,800) after the Liesing Creek joins the river. From these heavily wooded narrows the river enters the Tertiary basin of Leoben with its many fields; it extends to Bruck on the Mur.

The municipality of Leoben (population 35,600) the state's second largest city is the principal settlement of the Upper Styrian area. It includes among others the formerly independent settlement of Donawitz and Goess.

The city (municipality since 1160) used to be an iron trading center and the starting point of several iron shipment roads. The iron of nearby Mt. Erzberg and the brown coal deposits N of the city ("Seegrabner anthracite") here and in the Muerz Valley promoted the growth of a vast iron industry. The city of Leoben (called Liubium around 850) is the seat of a mining college and a mining and smelting school.

The building of the former Goess seminary (Styria's oldest seminary, founded in 1020) now houses a large beer brewery.

In Donawitz we find the blast furnaces and the iron, steel, and rolling mills of the Oesterreichisch-Alpine Montangesellschaft. The large workers developments of this company are situated on the periphery of the market community of Troifach (population 5,700).

The industrial city Bruck on the Mur (population 14,700) is the state's fourth largest city.

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By virtue of its location around a bridge across the river, it used to be an important commercial city in the Middle Ages (salt and iron trade). Today Bruck is an important railroad hub and the seat of an important industry (iron and steel plants, wood fiber and cardboard factory; brown coal mining; magnesite mining NW of Bruck in Laming Trench near Oberdorf).

(h) The Muerz River Valley. This valley forms the continuation of the upper Mur depression.

The 40 km long straight and uniform valley is divided into 2 long basins (St. Marein and Krieglach) by the Wartberg narrows. The layout of the valley and the basins is the result of tectonic processes. This is borne out by the frequent earthquakes (Mur -- Mt. Semmering line).

The valley floor is covered with meadows and fields which also spread to the slope steps. On the slopes, summits, and ridges however meadows and coniferous forests predominate. In addition to agriculture we find animal husbandry (Muerz Valley cattle) and forestry to be of importance.

The valley and the slopes are densely settled. The compact settlements are located in the valley; scattered and individual settlements are found on the slopes. The chief farmhouse type up to Wartberg is the bunched compound; E of this place the 4-cornered farm compound predominates.

Industry considerably contributed to the great population density of the Muerz Valley; this industry is based on the nearby iron ore and brown coal deposits, on the water power resources, and on the forests.

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The city of Kapfenberg (population 23,700), located at the mouth of Thoerl Creek, has large industrial installations (steel and iron plants; paper and chemical industry, building construction panels). Anthracite is being mined N of the city in Parschlug. A narrow-gauge railroad leads into the Thoerl Valley and on into the basin of Aflenz (summer open air health resort, winter sports center) to the terminal at Au-Seewiesen (brown coal mining to the E, near Goeriach). The road continues on to Mariazell via Seeberg saddle. There are trails leading from Kindberg (population 5,500; rolling and hammer mill) and from Krieglach (population 4,500; iron plant, machine plant) via Rosegger's "Waldheimat" am Alpl section and via the Fischbacher Alps into the upper Feistritz Valley. Wartberg is the terminal of the cable car of the Grossveitsch magnesite plant.

Near the city of Muerzzuschlag (population 11,100; steel, iron, and wood industry, ceramics; birthplace of Austria's skiing museum) we find the mouth of the Froeschnitz Valley along which runs the Semmering railroad.

At the foot of Semmering Pass lies Spital (population 2,500) which was founded as a hospital in 1160.

A railroad line runs up the Muerz Valley to Neuberg (population 2,200; steel spring plant, wood processing).

The former Cistercian abbey played a major role in the colonization of the region.

2. Central Styria

(a) The Central Mur River Area. Near Bruck the Mur Valley changes its general direction. Here begins the longest breakthrough valley section of the river. The latter first breaks through the

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gneiss arc and thus separates Gleinalpe from the Fischbacher Alps; from Mixnitz to the beginning of the Graz Basin it cuts through Devonian limestone.

Here the valley is cut 700-1,300 m deep into the surrounding mountains. The alternation of rock types makes the landscape rather varied. The gradient of the river is used in several places for the production of electric power, e. g., at Pernegg, Laufnitzdorf, and Peggau.

From Mixnitz an electric narrow-gauge railroad runs to the terminal at St. Erhard (Breitenau magnesite mine) on the northern foot of the limestone boss of Mt. Hochlantsch (1,722 m) which consists of bright red and white reef limestone.

Mixnitz Creek negotiates the great difference in elevation down to the Mur Valley in large waterfalls in the Baerenschuetz Gorge. Prehistoric relics were found in the Drachen cave SE of Mixnitz; these finds also date back to the Old Stone Age; large quantities of cave phosphate were obtained here as fertilizer.

The market community of Frohnleiten (population 2,300) lies on a river terrace high above the Mur. The market community of the many individual farms of the hill country to the E is Semriach in the NW of the limestone block of Mt. Schoeckl (1,445 m) on whose SE side we find the village of Radegrund (open air health resort, cold water sanitarium).

From Semriach we can reach the large caves of Lurloch into which Semriach Creek disappears in a limestone sink as it enters the limestone zone. The creek comes to the surface again near Peggau (Lur cave) at which point it is called Hammer Creek spring.

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From the market community of Deutschfeistritz (population 3,500; concrete, scythe, and sawmill industry) an electric railroad branches off to Uebelbach and a road runs into the heavily wooded but thinly settled Gleinalpe area.

In a wide valley cirque of the Mur we find Gratwein (population 2,000; coppor hammer plant) and Gratkorn (population 4,900; paper factory); in a sunny side valley stands the Cistercian seminary of Rein and the tuberculosis sanitariums of Hoergas and Enzenbach. The limestone is in many places being processed in gravel and limestone installations. At the last narrows of the river valley before we get to the old city of Graz, stands Judendorf over which towers the Gothic pilgrimage church of Maria Strassengel.

(b) Graz, the State Capital. Area: 127 sq km; population: 226,400; 353 m (Photo 44).

Graz, Austria's second largest city, is the seat of the state legislature and the state government of Styria as well as the seat of the bishop of Seckau.

The city has a university (founded in 1586), an engineering college, and all types of high schools and trade schools, as well as numerous archives, libraries, museums and collections (Joanneum), an opera and several theaters. Graz is the cultural center of Austria's southeast.

The industry includes machine building and metal products (e. g., railroad cars, motorcycles and bicycles, Andritz machine plant), paper, leather, textile, dyes, soap, toiletry, and wood industry, a glass goods plant, printing enterprises, brick ovens, and breweries ("Puntigam," "Reininghaus").

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Graz straddles the Mur where the latter enters the oval, N-S running basin of the Graz Field. Its position at the foot of a castle hill and on the Vienna -- Triest route greatly contributed to the development of the city. Graz has for centuries been a trade center (grain, cattle, wine) between 2 economically different areas -- the mountainous uplands and the lowlands.

The outer mountain arc of the Alps descends to the middle of the basin in steps; the last spurs directly surround the city. In the W, steep Mt. Plabutsch (764 m), closes off the northern part of the Graz Field and forms a barrier against the westward expansion of the metropolis. In the E the Young Tertiary hill ranges and the Paleozoic foothills of Mt. Schoeckl are divided up by short tributaries of the Mur. The city is expanding into these little valleys. The Mur divides the basin into 2 parts. The river placed its deposits in the form of terraces which in the area W of the Mur appear as N-S strips. E of the river the dolomitic castle hill juts out of the deposits. It protected the eastern part of the northern basin section against erosion. For this reason the transportation routes can radiate from the city into the valleys without difficulty. Terrace formation begins S of the old city and influences the direction of the roads, the development of the suburbs and the general growth of the city.

Graz is favored climatically by its position.

Graz (Hradec, meaning castle) first shows up in the records in 1129 as Bayrisch-Graetz since it was settled by Bavarians, in contrast to Windisch-Graetz. It was the palatinate of the Traungau marquesses of Steyr. The settlement was made a city in 1281. It became the residence of the Styrian line of the Hapsburg dynasty in

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connection with the Hapsburg land distributions in 1379 and 1464. During the reign of Ferdinand II the castle of Graz was remodeled into a strong fortress and thus became the southeat's border strong-point against the Turks. The city fortifications were razed in 1784; in 1809 the fortifications on the castle hill were dynamited in accordance with the peace treaty. All that remained was the clock tower, the landmark of the city. Magnificent parks were laid out in the area of the old fortifications. At the foot of the castle hill lies the old city with its beautiful burgher homes and palaces of the nobility. One of the most beautiful edifices is the State House in the style of the Italian early Renaissance.

The city center (First District, called "Graz City") gradually changed from a residential area to an administrative and business section (1869 -- 16,800 inhabitants, 1951 -- 11,067 inhabitants, "city formation"); it is surrounded by districts Nos II-VI which form the actual residential area with a part of the industrial and transportation facilities. This central ring-shaped area is surrounded by an outer ring consisting of districts Nos VII-XVI. The built-up area there is interspersed with gardens; in some places there are modern municipal developments and additional industrial and transportation facilities as well as villages and individual farms with farm plots and a forest belt which leaves the S side open.

The incorporation of the suburbs in 1938 increased the city area almost sixfold.

Only 6% of the entire municipal area are built up (1947); 25% each are woods and arable land, 20% are meadows (animal breeding and dairying); the gardens (16%), which to a minor extent furnish food products for the markets, penetrate toward the interior up to the built-up area.

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Graz is situated on the railroad line Vienna -- Laibach (Ljubljana) -- Triest and Laibach -- Fiume (Rijeka), Laibach -- Agram (Zagreb) -- Belgrade (Beograd).

Graz is also the center of lively local traffic. In addition to a rail line to the W into the brown coal region of Koeflach and another one to the E to the Aspang railroad and on to Budapest, there are many bus lines leading into the surrounding areas.

Thalerhof airport is S of the city.

(c) The Graz Plain and the Leibnitz Plain. S of the Mur narrows of Goesting we find the Graz Plain which extends to the narrows of Wildon (Mt. Wildoner Burgberg, 551 m); the Leibnitz Plain adjoins to the S.

Both river plains are covered with ice age river deposits. The flood plain zone on both sides of the river is not settled. The settlements stand on the river terraces. The fertile arable land and wine areas are densely settled. SE of Graz lies Tobelbad (mineral springs, health resort).

The main market community in the Leibnitz Plain is the city of Leibnitz (population 5,800). Near the village of Wagna S of Leibnitz used to stand the Roman city Flavia Solva. Spielfeld-Strass is the Austrian station on the Yugoslav border. Other border communities in the fertile Mur Plain are the market community of Mureck (petroleum region) and the city of Radkersburg (population 1,900; wine).

3. Western Styria

This area includes the eastern foothills of the Gleinalpe, Stubalpe, and Koralpe; the rivers (Kainach and Sulm) divide the area

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into long and fertile hill ranges deeply cut by the water bodies. Individual farm houses are found as high as 1,300 m elevation. The brown coal deposits in the vicinity of Koeflach (population 5,200; glass and shoe industry), Voitsberg (population 5,800; steam power plant, glass industry), Wies and Eibiswald are imbedded in Tertiary deposits. NE of Koeflach, near Piber, we find the government-owned Lippizan stud farm. The abrupt gradient of the Teigitsch feeds the large power plant at "Arnstein" (2 year-round storage areas: Pack area and Hiertzmann area; Langmann day storage area).

The hill country is ideal for farming and wine-growing.

From the city of Koeflach a road leads via Stubalpe (Mt. Gaberl, 1,551 m) into the Judenburg Basin and the Packer Mountain Road leads into the Lavant Valley. The road from Tobelbad and the railroad from Lieboch lead into the "Schilchergegend" area (named for a light, bright red wine) and into the Western Styrian wine and fruit growing area whose center is the market community of Stainz. In the upper Lassnitz Valley, at the foot of the Koralpe, stands the city of Deutschlandsberg (population 5,200; match factory); on the Sulm River stands the market community of Schwanberg, the terminal of the Sulm Valley railroad.

4. Eastern Styria

In the S this area is hilly and has many valleys; in the N it has forest-covered mountains, the foreland of the Fischbacher Alps and the Mt. Wechsel Massif (Photo 45).

The soil of the hill country consists of loam, sand, and gravel; the soil of the mountain region consists of crystalline rocks. The principal river is the Raab which like the other rivers

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forms a gorge in its upper course and a wide, flat valley in its lower course. The Tertiary deposits contain brown coal in the vicinity of Gleisdorf, Ilz (NW of Fuerstenfeld), Weiz, St. Kathrein am Haustein. The old tectonic processes are indicated by the volcanic masses in the East Styrian hill country, e. g., the Gleichenberg cones (andesite and trachyte), the basalt rocks of Riegersburg, Mt. Stradner Kogel, which is the remnant of a once 10 km long lava stream. In connection with the tectonic processes we also find the springs of Gleichenberg (and Tobelbad).

The hill country is protected against the N and open toward the SE. The mild climate and the good soil helped make the region a rich farm, fruit, and wine area (wheat, maize, millet, pumpkins). Only the gravel surfaces support pine forests. In the plains and along the eastern boundary of the state the settlements are mostly compact; in the hill country and in the mountains we find mostly individual settlements. In the E, starting with Gleisdorf, the 4-cornered farm house prevails; otherwise the bunched (grouped) compound is to be found everywhere else.

The railroad leads from Graz via Lassnitz Heights (600 m, water therapy institution) into the Raab Valley and to Gleisdorf (population 4,300), the center of Styria's fruit cultivation), to the city of Feldbach (population 3,300; branch line to Bad Gleichenberg) and to the market community of Fehring. From Gleisdorf a rail line runs to the city of Weiz (population 6,500; "Elin" electrical industry plant) and to the market community of Birkfeld and up the Feistritz Valley to Ratten. The Graz -- Budapest line is joined at Fehring by a line leading N to the Wechsel rail line (Aspang -- Vienna). On this line lies the city of Fuerstenfeld (population 6,600) with its large tobacco factory. The market community in the NE

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is the city of Hartberg (population 3,600; Loden cloth production). E of Hartberg we find the market community of Poellau (population 1,600; "Poellau Loden cloth"). The market community of Vorau is known for its Augstinian canon seminary founded in 1163. The southern spurs of the Mt. Wechsel Massif between Friedberg and Ratten are popularly called the "Jogglland" (for St. Jakob im Walde). From the city of Friedberg a rail connection was built with Burgenland (Pinkafeld) in 1925.

The settlements frequently developed out of border fortifications. The times of the border wars have left their reminders in the form of many ruins, castles, fortified churches (defense churches), and fortified cities with their large, rectangular city squares, e. g., Hartberg, Friedberg, Fuerstenfeld, and Radkersburg.

III. Economy

According to the value and quantity of the following natural resources, Styria takes first place among Austria's federal states (Table 5): iron ore (1952: 92% of Austria's total production), brown coal (58%), magnesite (56%), graphite (75%), talcum (84%). The boiled salt production only amounts to 19% of the total production (Einziger stone salt mining, 1,100 t). The large gypsum deposits in Wiesern on Lake Grundl (above and below ground mining) are being expanded in an effort to deliver more raw material for the sulfuric acid production of the Linz nitrogen plant.

There is a series of quite important therapeutic springs and mineral water springs.

Of these let us mention Bad Gleichenberg (mineral water shipment), the Woerschach sulfur baths, the thermal springs at Bad Einoed and Tobelbad and the sparkling mineral springs at Thalheim and Kalsdorf (S of Graz, mineral water shipment).

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Farmland takes up 15% of the area.

It is located in the main valleys and extends in an almost compact area from the Styrian rim mountains to the E and SE. In the N there are good oats, rye, and clover crops; in the SE there is also wheat, maize, and -- mostly as second crop -- buckwheat. The tilling and pasturing economy is quite widespread between 600 and 1,000 m elevation. Rape and rapeseed are grown in the warm sections of the state for oil production. In this respect Styria takes first place in Austria. Styria takes third place after Upper Austria and Carinthia in the cultivation of flax.

Wine production (S of the lower Kainach River, E side of Sausal, Windische Buehel) is always less than 10% of the total Austrian production. Styria is first in fruit growing; its apple crop is the largest in the country. In good years thousands of carloads can be exported. Efforts are constantly under way to improve the quality and the preservation facilities.

Meadows and pastures take up about one-fourth of the total surface area.

Of Austria's mountain states, Styria has the least Alpine pasture area because in many places the crystalline mountains hardly rise above the tree line. Dairying in the Central Alps frequently must take place on artificially cleared soil or in the form of forest pastures. The Alpine pasture region is clearly defined only in the Limestone Alps. Cattle breeding is closely connected with the presence of grass areas. In 1952 there were about 40 head of cattle per 100 inhabitants. The total number of cattle is still 11% less than in 1938. In the Alpine pasture areas we have the Pinzgau, Murbodner, Muerztaler, and Montafon breeds; in

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western and eastern Styria we have the Simmentaler breed and in exclusive dairy areas with valley pastures we have the Montafon brown cattle. Cattle breeding in general is designed more for beef cattle production than for the dairy economy and in general supplies local needs.

Styria's industry has always played a special role in Austria's overall industry.

Of the 45 Austrian enterprises with more than 1,000 workers, (1950), the state accounts for one-third; of those with 500-1,000 employees Styria accounts for one-fifth.

Mining and heavy industry are in the preponderance. These two basic forms are then followed by the paper, sawmill, and wood processing industry which is based on the large forests. The glass industry and the finished iron products are based on the coal deposits.

The iron producing enterprises are concentrated in the area of the city of Leoben, where we find mostly pig iron, crude steel, and rolled products which are also processed further. These iron processing enterprises are centered mostly in the Muerz and Mur valleys.

The main production center of the electric industry is in Weiz where there are also large plants for the production of generators, transformers, converters, etc used in power plants. A new establishment is the Deuchendorf plant in the area of the city of Kapfenberg where electric motors are being produced for various purposes. The 15 iron, steel, and metal foundries of the state produce parts for the electric, vehicle, and machine industries.

Brick ovens, located mostly in Eastern Styria, can cover the needs of the state. The cement plants at Retznei (near

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Ehrenhausen, NW of Spielfeld), Weissenegg (N of Wildon), and Peggau are important in the reconstruction effort. The Fraunethal porcelain factory (E of Deutschlandsberg) produces electric porcelain (for insulators, etc) and dishes, making it unnecessary for Austria to import these items.

The only deposit of trachyte tuff (see note) in Austria is at Gossendorf SE of Feldbach. ([Note] Trachyte tuff is an earthy rock consisting of chunks of pumice stone, trachyte, basalt, and clay slate. A mixture of concrete and trachyte tuff is especially good for construction work in water.)

Of all the federal states, Styria has relatively and absolutely the largest forest area (49%). The lumber is processed by about 1,300 sawmill enterprises.

Much cut lumber is being exported. Prefabricated wooden houses and barracks are being produced in Schladming and Krems near Voitsberg and are also exported. The crate and fiberboard industry likewise exports abroad.

Another major customer for wood is the paper and cellulose industry.

This industry could supply two-fifths of Austria's total production in this field. The principal production sites are located between Leoben and Wildon, going down the Mur.

The capacity for the production of all kinds of textiles amounts to only 5% of Austria's total capacity.

Leather is being processed mainly in 3 plants in Graz which can partially supply the 7 shoe factories of the state, among them the large enterprises in Koeflach and "Humanic" in Graz.

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The chemical industry is also quite significant.

Most of the match production of Deutschlandsberg can be exported. The Steirische Chemie-A. G. in Kapfenberg supplies the Lenzing artificial wool plant and the St. Poelten artificial silk plant with carbon disulfide. Dynamite needed by the economy is being produced in St. Lamprecht ("Dynamit Nobel").

The Styrian glass factories account for more than 80% of Austria's hollow glass production.

Despite the rich coal deposits, the consumption of electric power is increasing constantly.

In addition to power from its own facilities (steam and water power plants), industry in 1950 consumed more than half of Styria's power from plants producing for public use. The Mur River feeds most of the power plants which do not have their own storage facilities. The Arnstein ("Teigitsch") and St. Martin-Grimming ("Steirische Salza") power plants have year-round storage facilities. Large industrial enterprises also deliver current to the power network, e. g., the thermal power plants at Voitsberg, Donawitz, Fohnsdorf, Hoenigsberg near Muerzzuschlag, Gratwein (thermal plant and plant without storage facilities). The state's power production in general suffices to fill its needs.

IV. Government and Population (Table 10)

Styria is divided into 17 administrative districts (one city and 16 rural districts) including Graz City, Bruck on the Mur, Deutschlandsberg, Feldbach, Fuerstenfeld, Graz area, Hartberg, Judenburg, Knittelfeld, Leibnitz, Leoben, Liezen, Murau, Muerzzuschlag, Radkersburg, Voitsberg, Weiz.

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The farm house type in the eastern part of the 4-sided compound, otherwise the bunched compound prevails; in the mountains of Upper Styria the single-unit farm house predominates. About 2% of the population live at 1,000 m elevation and higher.

Linguistically Styria is a transition and adjustment area. The dialects reveal features of the South and Central Bavarian dialects.

BREAKDOWN OF THE POPULATION BY OCCUPATIONS
(1951)

	Employed people	Farming Forestry	Industry Trades	Business Transportation
234,000 [A]		43%	36%	10%
Occupational Subdivision of the Population [B]		30%	36%	10%

	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
[A]	5%	3%	2%	-	1%
[B]	4%	3%	1%	14%	2%

Compare and compile:

Mining areas (Table 5). Industrial regions. Railroad hubs. Population increase from 1934 to 1951 in comparison to Austria's overall population increase during this period.

Upper Austria

Area: 11,980 sq km; population: 1,108,700 (1934: 902,300); relative population density: 93 (Table 10).

I. Location (map exercise)

Trace the state boundaries; list neighboring states and countries; list rivers forming boundaries; Alpine mountain groups in Upper Austria which form the boundary. Part of Upper Austria which belongs to the drainage area of the Elbe River. Rivers whose source area is outside the state. Lakes entirely or partially located in Upper Austria. Geological structure (cf map in atlas).

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II. State Sections

1. The Alpine Area

(a) The Salzkammergut Area. (As former principality property (salt mines and forests) this area was under the jurisdiction of the principality's legislature (fiscal administration).) This area is the river area of the upper Traun and Ager rivers up to the flysch zone. Most of the area belongs to Upper Austria, smaller parts belong to Styria and Salzburg. The region reveals many varied formations and is subdivided into smaller mountain groups. The lakes are the landscape and economic centers of the Salzkammergut area.

Lake Hallstaetter (area: 8.6 sq km; depth: 125 m), surrounded by steep walls, lies in a trough terminal of the diluvial Traun glacier (Photo 46). The Traun which flows through the lake comes from the Koppen Valley where its floods often caused the railroad and road to be moved. At its mouth it forms a small valley plain on the lake (lake bed); Obertraun stands on a valley ledge. This is the starting point for climbing tours to the Mt. Dachstein caves (Rieseneis cave, 1,462 m and Mammut cave, 1,322 m; cable car).

On the western shore of the lake, on the small alluvian plain of Wald Creek, stands the market community of Hallstatt (population 1,400) whose houses stand on the slope steps of Mt. Salzberg.

Salt mining in this area dates back to prehistoric days and is based on the vast salt clay deposits (Hasel Mountains) which are superposed by Werfen slate and Hallstatt limestone. More than 2,000 skeleton and cremation graves from the early ice age were opened on Mt. Salzberg. The grave relics, many of which are on display in the local museum, indicate a high level of culture which was given the name "Hallstatt civilization" for this vast cemetery.

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The salt water from Mt. Salzberg (Plassen) is piped to the boiling houses in Hallstatt, Ischl, and Ebensee. The Echern Valley S of the village offers the easiest route (bridle path) to the Mt. Dachstein Plateau and to the Karls ice field (Simony shelter, named for the explorer of Mt. Dachstein, Fr. Simony; Photo 7). A special event in Hallstatt is the Corpus Christi Day procession which moves in boats across the lake. On the N end of the lake lies Steeg (electric and coal power plant, textile industry, chalk plant). Up Gosau Creek there is a road leading to Gosau and on to Lake Vorderer Gossau through the meadows of the wide valley section. This lake feeds the railroad power plant at Steeg, serving as storage reservoir. From Lake Hinterer Gosau there is a comfortable trail to the Mt. Dachstein Plateau (Adamek shelter). The Gosau lakes are beautiful examples of glacial valley step lakes. From Gosau we travel via Gschuett Pass (971 m) to Abtenau and Golling.

After leaving the lake, the Traun River flows N. The city of Goisern (population 6,100, sawmill) is a summer resort known for its bromine and iodine containing sulfur springs. Here we meet the road which comes from Aussee via Poetschen Pass. Individual farms can be found on the valley ledges of the wide sections of the valley.

Bad Ischl (population 13,400; salt mine, glass production, chemical plant) is the center of the Salzkammergut area. The city lies in a basin-shaped bulge of the Traun Valley where the Ischl River flows into the Traun.

Ischl has been a health resort since 1822; the salt water and a common salt spring as well as a sulfur spring are used for therapeutic purposes. The salt mine lies to the SE at about 1,000 m elevation.

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The extensive diluvial deposits in the broad col between Ischl and Lake Wolfgang are used for farming and are densely settled. Lake Aber or, as it is also called, Lake Wolfgang (area: 13.2 sq km, depth: 114 m) is gradually being divided into 2 separate basins as a result of the heavy rubble deposits of Zinken Creek (Photo 48).

The very popular summer resort of St. Wolfgang (population 2,500) on the Upper Austrian shore is famous for its Gothic altar built by the Tirolian Michael Pacher in 1481. The station of the cogwheel railroad to Mt. Schafberg (1,783 m, famous scenic observation point) is located on Upper Austrian soil.

Lake Traun (area: 25.7 sq km, depth: 191 m) extends from the Limestone Forealps through the flysch zone into the Alpine Foreland which explains the variety in its shore landscape. The hills at the N end of the lake are terminal moraines of the ice age Traun glacier. The limestone cone of Mt. Traunstein, which just out to the N, is visible for miles around due to its characteristic shape and considerable height (1,691 m). On the S shore lies Ebensee (population 10,300; salt baths, salt mine since 1607, ammonia and soda plant, textile plant, cement plant).

From Ebensee a trail leads through the Langbath Creek Valley to the Langbath lakes on the N slope of the Hoellen Mountains; Ebensee is the valley station of the cable car up Mt. Feuerkogel (1,534 m, skiing area).

The summer resorts of Traunkirchen and Altmuenster (population 7,300) are well known. On the N shore of the lake stands the city of Gmunden (population 12,900; wood industry, Gmunden ceramics, portland cement plant, beer brewery, shoe factory).

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Gmunden, situated on the site of a large Bronze Age settlement, was the transshipment point of the salt coming from the Salzkammergut area and of grain for the upper Traun area. It is a well-known tourist center.

Lake Atter, also called Lake Kammer, (area: 46.7 sq km, depth: 171 m) lies in the North between wooded mountains of the flysch zone and the moraine hills of the foreland, while the southern part extends into the Limestone Alps (Hoellen Mountains, Mt. Schafberg). Its drainage river is the Ager.

The most important settlements along the northern part of the lake are the market community of Schoerfling (sawmill), Kammer (rail connection with Voecklabruck, glass products and toys), and Attersee (rail connection via Markt St. Georgen in Attergau with Voecklabruck). Along the southern part we find Weissenbach (fishery, federal biological institute) and Unterach (population 1,800). At this point the See Ache River flows into the lake; this river is the drainage river of Lake Mond.

Along the geological boundary between the Limestone Forealps and the flysch zone lies Lake Mond (area: 14.2 sq km, depth: 68 m) in a depression; its northern continuation is Lake Zeller. Lake Mond takes in the drainage of Lake Fuschl, the Fuschl River, which comes from the W and is pushing a huge delta into the lake. The chief settlement is Fuschl (razor blade factory). From the N comes the Zeller River, the drainage of Lake Zeller, also called Lake Irr. On the NW shore on rising terrain stands the market community of Mondsee (population 2,500).

The lake dwellings in Lake Mond establish the fact that the area was settled in the distant past. The former Benedictine cloister (founded in 748) was the cultural center of the area.

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The dairy industry of the region (Lake Mond cheese) indicates the abundant animal husbandry.

The chief income sources of the population of the Salzkammergut area are tourist trade and salt and lumber exploitation. Meadows and Alpine pastures favor animal husbandry. The lower sections are covered with fields, e. g., between Bad Ischl and Strobl and in the area of Lake Mond and Lake Zeller. The people live chiefly on individual farms. The abundance of wood gave birth to the local wood carving art (domestic industry), especially in Hallstatt, Gosau, Goisern, and Ebensee. The abundance of wood is even greater in the Forealps. In this section continuous forests extend from the Traun to the Steyr rivers. Fishing is also of significance (brook and lake trout, salmon trout).

(b) The Alps between the Traun and Enns Rivers. (The Upper Austrian Eisenwurzen area.) The southern state boundary mostly runs along the divide of the Limestone High Alps. These mountains are divided into sections by Mt. Salzsteigjoch (1,684 m), Pyhrn Pass (945 m), Buchauer saddle (838 m), and the Enns River breakthrough. The major groups are the Totes Gebirge Mountains (Mt. Grosser Priel, 2,523 m), the Warschenock Group (2,389 m), and the Haller Walls with Mt. Grosser Pyhrgas (2,245 m).

The Limestone Forealps which adjoin to the N in general are divided into smaller, more isolated groups by the Alm, Steyr, and Enns rivers and their tributaries; the largest and highest of these groups is represented by the Sengsen Mountains (Mt. Hohe Nock, 1,961 m).

Then follows the narrow strip of the Flysch Alps which on the whole make a transition into the Alpine Foreland along the line Gmunden -- Steyr.

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The rather abrupt mountains of the limestone zone as well as the gently rounded mountains of the flysch zone bear meadows, large forests, and Alpine pastures. In the flysch zone the fields extend up to the ridges of the mountains; the valleys are wide and well cultivated. Forestry and animal husbandry are the main occupations of the population which lives mostly on individual farms and in hamlets.

The many valleys facilitate the passage through the mountains; these routes were used in iron trade during the old days. An important iron industry developed rather early particularly in the area of the Enns and Steyr rivers; this industry developed here on account of the nearby deposits in Styria's Mt. Erzberg and as a result of the available timber resources (charcoal) as well as due to the huge water power reserves. The many small enterprises have long since disappeared; in several good locations small-scale iron industry developed in their place; the production of these enterprises is considerably larger than that of the enterprises in the Lower Austrian "Eisenwurzen" area (e. g., Melln, Steyrling, Rossleithen, and Piessling, W of Windischgarsten; Kirchdorf and Micheldorf on the Krems).

One of Austria's most famous iron industry centers is the "iron city" of Steyr (population 36,800; has its own city constitution). Its general vicinity is the seat of a branch of the "Steyr-Daimler-Puch" A. G. (tractors, trucks, ball bearings, hunting rifles) and many other industries (knives and steel products; textiles; sawmills; modern jewelry of the Gablonz type). The city grew around the old "Styra Castle" (residence of the Traungau counts) along the Enns at the confluence of the Steyr and Enns rivers. In the Middle Ages Steyr was the largest city of the state and an important transshipment point for the iron trade.

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The road along the Enns from Hieflau to Steyr is called the "iron road" because much iron used to be shipped over it in the old days. In the past shipping used to start on the Enns River at Hieflau; the trail for the horses pulling the barge trains is still preserved in places.

In Steyr we also meet the old transportation artery which follows the valleys of the Steyr and the Teichl and leads via Markt Windischgarsten, Spital am Pyhrn, and Pyhrn Pass into the Enns Valley; in Klaus-Steyrling the Steyr Valley railroad joins the main line, the Pyhrn rail line from Linz to Selztal. Spital am Pyhrn had a hostelry as early as during the time of the crusades.

A connection exists via the market communities of Weyer and Gaflenz into the Lower Austrian Eisenwurzen area (Enns Valley -- Ybbs Valley).

The water power of the rivers is also used by many sawmills and wood industry establishments.

In view of its large water volume and the favorable gradient, the good storage possibilities in the many deeply cut valley sections, and the closeness of the major industries in Upper Austria, the Enns River will become a center of Austria's power supply.

Of the 13 planned power plants (see Figure 10) from the Upper Austrian border to the mouth of the river, the plants at Grossraming, Ternberg, Staning, and Muehlrading are in operation at this time. A fifth plant commenced operations in 1953 near Rosenau.

Gruenau (wood industry) is the starting point for trips into the Totes Gebirge Mountains (Lake Alm, Lake Ofen) and to Windischgarsten and Vorderstoder and Hinterstoder.

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2. The Alpine Foreland

(a) The Attergau Area. Between Mt. Hausruck in the N and the flysch mountains in the S lies the Attergau area, the flatly undulating moraine terrain of the Traun glacier. It is 500-600 m high, fertile, and therefore densely settled (Photo 49).

Here the Western Railroad crosses the state boundary along the divide between the Voeckla Valley and Lake Waller (Traun -- Salzach) at an elevation of 600 m.

Major settlements are located along the main traffic artery, e. g., the market communities of Frankenmarkt (population 2,600; metal processing) and Voecklamarkt (copper and aluminum foundry), Timelkam (major thermal power plant, Hausruck coal), and the city of Voecklabruck (population 8,800; metal processing, asbestos cementboard production ("Eternit"), leather factory, hemp processing). There is a large brewery in Zipf. Attnang-Puchheim (population 6,800; pencil factory, metal processing) developed rapidly as railroad hub. In Lenzing (population 4,600), N of Lake Atter, there are a cellulose and paper factory and an artificial wool factory, the only one at this time.

(b) The Lower Traun River Area. Moraines and high terraces spread out between the Ager and Traun rivers. High and low terraces accompany the narrow valley of the Traun to Lambach; in its lower course the valley is wide and enters the formerly little fertile low terrace area of Wels Heath where the forests now cover only the infertile gravel surfaces; major reforestation projects are under way in an effort to improve the climate and the soil. Today Wels Heath is well cultivated. It has many settlements; there are few individual farms (population density without Wels is more than 250).

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On a gravel terrace along the Ager we find Schwanenstadt (population 3,200; hammer and wire plant, weaving plant; production of food preparations; cattle markets) and the old town of Lambach (sawmill, wood processing machines, weaving plant, oxygen and hydrogen plant). The Benedictine abbey was founded in 1040. On the confluence of the Traun and the Ager we find the town of Stadl Paura (population 6,000).

A few km S of Laakirchen (population 5,600; paper factory) the hard, bench-shaped gravel masses of the ice age formed the Traun cataract (power plant).

The main settlement of the Traungau area and Upper Austria's third largest city is Wels with a population of 38,100.

Ovilava was an important trade and transportation center as early as during Roman times. In the early centuries of our era Wels was the center of the knife, needle and blade smithies which obtained their iron from Steyr. Master singer Hans Sachs lived in the city in 1513. Maximilian I died in the former imperial castle in 1519. Today the city is an important transportation hub. The Orient Express and the Ostend Express meet here. The city is a center of farm products trade (weekly cattle market). The biannual autumnal Wels Folk Festival, a sort of fair for farming articles, is famed beyond the state borders. The industry of the area produces among other things farm machinery, food preparations, ceramics and chemical products; radiators, ovens; paper and leather; scales, bicycle engines. In and around Wels natural gas has been obtained since 1891 in small quantities. In 1902 the drillings hit granite at a depth of 1,048 m.

The factory settlement of Traun (population 9,600; textile industry) is Upper Austria's largest village in view of the number

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of its inhabitants. About 4 km above the Traun River mouth we find Ebelsberg (textile industry, iron foundry) which, like the industrial settlement of Kleinmuenchen (textile industry) belongs to Linz.

(c) The Traun and Enns Plateau. Between the Traun and the Enns lies the Austria's largest diluvial gravel landscape, the Traun-Enns Plateau, which rises with a high cliff on the right Traun bank. This plateau is cut up into an interstream landscape by the tributaries of the Traun, Danube, and Enns. The loess cover and the climate which favors agriculture helped make this area a very pro- ductive farm region. The forest separated into individual patches, covers only about one-eighth of the surface. Imposing 4-cornered farm compounds are scattered about the fields. There are no major settlements.

In the middle of the plateau lies Kremsmuenster (glass and custom jewelry of the Gablonz type), known for its Benedictine seminary founded in 777, the Cistercian seminary at Schlierbach to the S, founded in 1255, and, to the N of the city and W of the Enns the market community of St. Florian (bell foundry) with the Augustinian canon seminary founded in 1071 where Anton Bruckner is buried.

Bad Hall (population 3,300) has iodine and bromine contain- ing salt springs (drinking and bathing cure) from which salt was obtained even in the old days. The iron producing city of Steyr situated at the edge of the Alps has been mentioned previously. On the northern tail of the high terrace leading down to the alluvial floor stands the city of Enns (population 8,200; sugar factory; machine and gear wheel plant, glass jewelry and custom jewelry produc- tion).

The city, which holds Austria's oldest municipal statutes (1212), sprang up as Bavaria's border fortress ("Enns Castle")

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against Hungary at the site where the river crossing could be blocked. On the lower terrace used to stand the Roman settlement of Lauriacum, today's village of Lorch, on an important transportation route.

(d) The Hausruckviertel Area. Mt. Hausruck (800 m) and Kobernauser Forest are clearly distinguished from the hill country by virtue of their height and rich forest cover. This is the large brown coal region around Wolfsegg, Thomasroith, and Ampfelwang.

The basal mountains (basal part) consist of Middle Miocene clay marl. Discordantly overlain we find the coal bearing Sarmatian (Miocene) and on top of that Pliocene gravel (the hanging wall). After the deposition of the latter severe erosion set in, dividing the deposits into several lobate islands. In coal mining one sometimes hits gray clay which is used in the production of ceramics.

The Attnang-Puchheim -- Reid -- Schaerding rail line runs through Mt. Hausruck in a 600 m long tunnel.

The Inn Creek area adjoining to the NE has fertile fields; the predominant settlement form is the individual farmstead. E of the city of Grieskirchen lies Bad Schallerbach with its therapeutic, carbon dioxide containing sulfur thermal spring (37° C).

It was discovered during a search for petroleum in 1918 at a depth of 460 m in sand and granite blocks. A thermal spring (34°) was likewise discovered in Leppersdorf, S of Eferding. Near Taufkirchen on the Pram asphalt containing petroleum was extracted until 1952. S of Grieskirchen lies Gallspach with its radiation institute which is visited by many foreigners.

(e) The Innviertel Area. This is the area between the Salzach, Inn, Danube, Mt. Hausruck, and Inn Creek.

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W of the Mattig lies the upper Inn area a moraine landscape formed by the terminal moraine of the Salzach glacier. In glacial troughs we find large moors, e. g., Ibner Moor; near the market community of Uttendorf we encounter Austria's northernmost terminal moraines. In the W and E large, continuous forests fill considerable parts of the low terrace (Weilhart Forest and Lach Forest). The higher steps bear fertile farmland and meadows; individual farmsteads and hamlets are scattered far and wide. In the Mattig Valley, through which runs the main traffic artery, there is a series of major settlements whose most important one is the market community of Mattighofen (population 3,500; leather factory, brewery).

In the area of Ostermiething and Trimmelkam large brown coal deposits have been discovered recently ("Salzach coal").

Sau Forest ("Passauer Forest"), which lies in the N is a part of the Bohemian Massif cut off by the Danube. Trench valleys cut it up into many interstream plateaus. Forests predominate in this area.

The clay marl area adjoining to the S with its gently rolling formations and wide valley floors is fertile farm country. It belongs to Austria's most fertile areas. Between the many market communities there are many individual farms; in the E there are 4-cornered farm compounds and in the W there are four-sided compounds. The large size of the Inn area farmsteads is a result of the farming of the "Koerndl" [little grain] farmer under the favorable influence of climate and soil.

In the steep bank of the Inn we find the border crossing points of Braunau and Schaerding (Photo 50). The city of Braunau (11,600) is connected with the Bavarian Simbach village by a highway and railroad bridge. Schaerding (population 5,800; cold water therapy

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institute; dairy; breweries; stone quarries) looks like a real old-fashioned town. To the S stands the Reichersberg canon seminary (founded in 1084) on the Inn. The chief settlement of the Inn area is the city of Ried in the Inn District (population 10,000; market community for grain and cattle; wood products industry, rope factories, leather factory, food preparations; folk festivals, alternating with Wels each year).

The Inn River with its large water volume under normal conditions pours more water into the Danube at Passau than the Danube itself has at that point.

During World War II the Ering and Obernberg continuous service power plants were built to supply the aluminum plant at Ranshofen near Braunau. Today the power produced is divided between Bavaria and Austria. New power plants are under construction or planned at good sites, e. g., S of Braunau, S of Schaerding, and above Passau; these are parts of a cooperative project between Bavaria and Austria.

3. The Danube Valley in Upper Austria and Linz, the State Capital

The alternation of narrow and wide sections makes the Danube Valley one of the country's most beautiful areas. In the narrow sections the woods mostly touch the very banks of the river while on the heights there are settlements and fields and on the slopes there are castles and castle ruins.

In the wide sections where the river piled up gravel and sand, we can see the floodplain forests and on the terrain which is protected against floods we note fields and meadows. Most of the settlements are located on the protected high terraces.

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In the "Passau Valley" (Passau -- Aschach) lies the market communities of Engelhartszell and Wesenufer.

Above Engelhartszell a power plant is under construction on the Danube (Jochenstein storage step) under a joint project with a German company; further below on the left bank the Ranna Creek gradient step (Ranna Dam) is being exploited by a power plant.

Near Schloegen the Danube now very narrow, forms the semi-circular "Schloegen loop." There is a paper factory in Obermuehl; near the mouth of the Grosse Muehl River stands the Partenstein power plant (Langhalsen storage area).

The market community of Aschach (population 2,100; brick oven, production of electric heating devices) lies on the northern edge of the Eferding Basin (field and vegetable cultivation). The city of Eferding (population 3,400; brick oven; canned food factory) named in the Song of the Nibelungs, is connected with Linz by an electric narrow-gauge railroad. In the Linz Gate, opposite Markt Ottensheim, stands the Wilhering Cistercian seminary (1146).

Linz, the capital of Austria, grew on the W end of the Linz Basin (Photo 65).

Linz developed as a river crossing settlement at the place where the Danube leaves the massif and where a number of roads meet. This is the point of intersection of the waterway and the WSE overland route, as well as 3 roads from the Bohemian Forest (via Aigen, through Hasel Ditch, and the old salt road via Kerschbaumer saddle); these cross the Danube at "Urfahr" and continue on to the S into the Salz-kammergut area. The road starting at Wels, which used to lead to Pyhrn Pass, was rerouted to this point, as was the route to Salzberg. Today the city lies on the international traffic arteries from Vienna to Paris and from London and Prague to Triest.

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The city's location determined its growth, as did the fact that it lies at the point where Upper Austria's various landscapes meet. This explains the importance of the city as trade center (former salt shipments to Bohemia). In recent times the city has witnessed at rapid development of its industry and trades.

At the foot of the eastern spur of Kuernberg Forest (fortress hill) the Romans erected the Danube strongpoint called Lentia. At this point developed the oldest part of the city, growing mostly from N to S. The more recent parts grew along the E-W traffic arteries and spread to the left bank of the Danube. On Mt. Poestlingberg, where we can enjoy a view of the distant Alps, stands a pilgrimage church, a landmark of the city. Another landmark is the Marien Cathedral with its 135 m high steeple, built from 1862-1924.

Linz, called Lintza in 788, has belonged to the bishopric of Passau since 823, was listed as a customs duty station during the tenth century and came into the possession of the Babenberg dynasty in 1211. In 1490 it replaced Wels as state capital. In this city the famous astronomer Johann Kepler taught and set up his "Rudolfinian Tables"; Emperor Frederick III reigned there from 1489 until his death. Anton Bruckner was cathedral organist at the Jesuit Church. In front of the State House stands the monument to Adalbert Stifter and in the Public Gardens stands the monument to the Upper Austrian folk poet Franz Stelzhammer.

In 1832 Central Europe's first horse-drawn railroad was built from Linz to Bohemia (Budweis); in 1858 the Western Railroad from Vienna to Linz and on to Salzburg was built. The connection with the S was established by the Pyhrn railroad which was completed in 1905. Several local rail lines also start at Linz, e. g., to Aigen-Schlaegl and to the junction at Eferding. The Danube Navigation

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Company has its chief port there. Three of the 4 Danube bridges in Upper Austria cross the river in the city area. The airport at Hoersching, SW of the city, connects Linz with the worldwide airlines systems.

Linz is the seat of Upper Austria's state legislature, the state government (since 1785), and a bishop. In addition to the various government agencies, civic bodies, institutions, and educational facilities, Linz has a theater and several museums.

In 1951 the city had 184,600 inhabitants; in 1840 it had 23,000, in 1910 68,000 in 1938 125,000, and in 1945 194,000. Many of the more than 30,000 stateless individuals have left. In recent decades the city area was enlarged (96 sq km) through the incorporation of adjoining communities.

During World War II new industries were added to the existing one; 2 of these are tremendous considering Austrian conditions and give the city its new look and economic importance; they are the Vereinigte Oesterreichische Eisen- und Stahlwerke A. G. (Linz foundry), called "VOEST" for short, with more than 10,000 workers (in 1951) and the "Oesterreichische Stickstoffwerke A. G." with more than 3,200 workers (in 1951). These new industrial undertakings were decisively influenced by the nearby Mt. Erzberg, the cheap water transportation route for the coal shipments from the W and the location along the hoped-for future water route from Rotterdam to Galatz which will however depend on the completion of the Rhine -- Main -- Danube Canal. The port of Linz whose cargo handling capacity is already more than one million t per year, is in the process of being expanded (pier facilities). A free trade zone will be set up in the port area. The waterway is a basic requirement for the business efficiency of the large-scale enterprises in Linz. The shipyard of the Danube Navigation Company is also capable of building seagoing ships of up to 2,000 GRT.

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In the area of Greater Linz we also find the following additional industries: machine plants, metal industry, chemical industry (matches), bell foundry, quartz lamp and glass goods, production, wooden products, textile and paper factories, tobacco factory, food products, substitute coffee, breweries.

Near the market community of Mauthausen (population 3,500) the granite mountains again touch the river. The settlement grew around a bridge and toll station (today railroad and ferry). Its stone quarry is quite important (cobblestones).

Below Mauthausen, on the left bank, extends the fertile Machland area which is filled with fine-grained river deposits of the Aist and is densely settled. The major settlements stand on a Danube terrace, e. g., the market communities of Schwertberg (kaolin pits) and Perg (production of artificial millstones).

The chief settlement of the Strudengau area (river valley from Ardagger to Ybbs, Photo 66) is the little town of Grein (population 2,500; sawmill, large apiary) with Austria's oldest theater, preserved in its original form and furniture. Downstream stand the market community of St. Nikola and the village of Struden; NW of Grein is Bad Kreuzen (health resort, radioactive springs).

4. Upper Austria's Part of the Bohemian Massif (Muehlviertel Area)

The term Muehlviertel denotes the entire area of Upper Austria N of the Danube, although the name itself applies only to the western part, the area of the Grosse Muehl and Kleine Muehl rivers; the part E of the Feldaist River trough used to be called Riedmark.

The Bohemian Massif in general extends to the Danube; some parts of it were separated from the main mass by the river (Sau Forest, 876 m; Mt. Mayerhofberg, 655 m; Kuernberg Forest, 524 m).

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The overall character of the natural unit is preserved by the granite structure with its block landscape, the wide synclinal valleys with their gently rising slopes in the upper course, the deep trench valleys in the lower course which in the river mouth areas often form valley gorges, the little basins and small plateaus, the predominance of coniferous forests partly in continuous areas, partly separated into individual patches. In addition there is the uniform distribution of the settlements; between the individual farmsteads, among which the 3-sided compound predominates, we can find almost always the small, compact parish villages and market communities whose churches are visible from far away especially in the eastern part. More than a third of all of Upper Austria's market communities lie in the Muehlviertel area (Photo 51).

The rough climate restricts agriculture at higher elevations; in the E it takes up more than 50% of the area of basins and valley bulges.

The troughs of the Grosse Muehl and Feldaist rivers divide the Muehlviertel area into 3 sections which in the southern part were known by their medieval names of Passau Forest, Linz Forest, and Grein Forest. Passau Forest is a continuation of the Bavarian Forest. On Mt. Ameisberg (940 m) it has compact wooded areas along whose edges there are settlements. The middle part is the continuation of the Boehmian Forest; the wooded area in Stern Forest (Mt. Sternstein, 1,125 m) is still compact but dissolves into separate patches in the S in Linz Forest.

The Muehl trough was the "royal road" ("via regia") of the Middle Ages and constituted the easiest connection between the Eferding Basin and Bavaria; it is partly used by the Muehl District

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railroad from Urfahr to Markt Aigen in whose vicinity stands the Premonstratensian seminary of Schlaegel (1120); the railroad links the market communities of Neufelden, Haslach, and Rohrbach (cattle markets) which are the centers of an old linen industry based on the local flax cultivation.

In Linz Forest the trough of Hasel Trench created a connection with the upper Rodl Valley, the shortest route between Linz and the upper Moldau River; along this line sprang up the market communities of Hellmonsoedt, Zwettl, and Leonfelden.

The widest and most important depth line is the Feldaist trough which runs S of Freistadt in the Feldaist Valley; N of it, it crosses the divide between the Aist and Moldau rivers via Kerschbaumer saddle (685 m). The points of intersection not only of the road and railroad from Linz and Enns but also of the roads from the Riedmark section are formed by the market communities of Praegarten (ceramics industry) and Kefermarkt (Gothic wing alter).

The largest highway hub is Freistadt (population 5,100), the only city in the Muehlviertel area.

This place was founded as fortress town by Otto of Machland in 1130 and settled with free yeomen; the original town plan is still discernible today. The city, with its walls and beautiful gates, stands in a bulge of the Feldaist Valley and forms the point of intersection of 7 roads. Freistadt has a railroad station serving the eastern Muehlviertel area. The Linz federal highway runs to Freistadt via the market communities of Gallneukirchen and Neumarkt in the Muehl District.

The area E of the Feldaist trough, which is drained by the Waldaist, Naarn, and their tributaries, in the N has a plateau character;

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the rolling plateaus, with a few knolls jutting out (Mt. Viehberg, 1,111 m), bear large forests. Woods also predominate in the middle and southern parts (Grein Forest). The few settlements stand on the heights amid clearings, e. g., Liebenau, the highest situated parish village in Upper Austria (967 m).

III. The Economy

In the Hausruck area we find one of Austria's largest coal fields.

Though it contains only lignite, which has a low heating capacity, it is nevertheless indispensable for a major part of Upper Austria's industry. SW of Weilhart Forest higher quality deposits are being explored according to plan ("Salzach coal": Ostermiething, Trimmelkam).

Salt water is processed in the boiling plants of Hallstatt, Bad Ischl, and Ebensee; it comes from the salt mines of Hallstatt, Bad Ischl, and Bad Aussee and accounts for more than 3/5 of Austria's salt production.

Salt water is also processed by the chemical industry in Ebensee whose products, among others, also facilitate the operations of the artificial wool factory in Lenzing.

Building and cobblestones of granite are being quarried near Schaerding on the Inn and Mauthausen. The cement plants in Gmunden and Kirchdorf on the Krems and the "Eternit" plant in Voecklabruck are also important.

The many trial drillings in the Alpine Foreland in search of petroleum resulted in the discovery of the thermal springs of the popular health resort of Bad Schallerbach; in Leoprechting near

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Taufkirchen on the Pram these drillings revealed heavy, thick-flowing crude oil in small quantities; the VOEST processes this oil into asphalt along with other by-products in connection with coke production. The number of iodine-bromine springs in Bad Hall was increased by new drillings. Salt water is used for therapeutic purposes also in Bad Ischl and Goisern (iodine-sulfur springs. The health resort of Gallspach ("Zeileis" Institute) is world famous.

The farm area shrank considerably -- 26% of the total area in 1951 as compared to 34% between 1926 and 1935 -- but is still above Austria's overall average.

About half of the agricultural area consists of arable land; fodder crops, oats (particularly in the Muehlviertel area), rye, wheat (except in the Machland and Muehlviertel areas), and potatoes head the list. Sugar beets grow in the eastern Alpine Foreland and in the Machland area (Enns sugar factory). Local farm products to some extent also form the basis of the considerable food industry (e. g., in Wels) and of the brewing and milling industry. Of all federal states, Upper Austria produces the largest quantity of flax (Muehlviertel area) and the largest pear crop (cider).

The large percentage of meadows in the total agricultural area (44%; pastures only 5%) favors cattle breeding.

In 1952 Upper Austria had more than 3% more milk cows than Lower Austria which is half again as large. About 80 enterprises, among them large-scale ones like the one at Schaerding, process milk for consumption and make butter and cheese ("Achleitner Schloss cheese," "Lake Mond cheese," "Sirius cheese," etc). In 1952 there were roughly 52 head of cattle per 100 inhabitants.

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The forest area -- 33% -- does not quite match the Austrian overall average.

About 100 sawmills are in operation in the state. These are closely connected with the wood processing industries (furniture, wooden houses, crates, plywood, etc) and the cellulose and paper factories which account for about one-fourth of the Austrian production potential and export on a large scale. The products of the Lenzing artificial wool factory (artificial wool and pellucid packing material) are based to a great extent on the local forest resources.

Nearby Mt. Erzberg caused the iron industry to spread along the Enns and Steyr rivers down through the centuries.

Steyr and its vicinity still have an important knife industry. Many scythe plants are producing for export. The products of the "Steyr-Daimler-Puch, A. G." are world famous. In this farming area the farm machinery industry developed long ago; its center is in Wels and vicinity.

During World War II several large-scale industries sprang up. The largest of these are the VOEST plants, the Oesterreichische Stickstoffwerke (both in Linz), and the Vereinigte Aluminiumwerke in Ranshofen.

Almost 75% of the production of the Stickstoffwerke [nitrogen] company are exported. This plant also produces various chemicals for other industries. The aluminum plant is the largest power consumer of all of Austria's enterprises. In 1952 the plant produced more than 31,000 t of crude aluminum.

The textile industry and processing installations and the large leather industry are also important.

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The flax thread spinning plant at Lambach is the only installation turning out this product. Mattighofen is the center of the largest Austrian leather production plant.

Ethnic Germans immigrating from abroad founded a new glass processing plant in the state, i. e., "glass and custom jewelry of the Gablonz type."

Most of the Gablonz goods are not being produced on a mass production basis. More than 140 enterprises employ about 2,000 workers; 90% of the goods are being exported.

The economic structure of the state changed basically during World War II.

In addition to the mentioned new major industries, the state was successful in repairing its war damage comparatively quickly. Old installations were remodeled and enlarged; transferred enterprises took new roots and many new companies were set up. In Linz alone the number of industrial enterprises rose from 119 in 1939 to 181 in 1949. There too we find 4 of the 9 enterprises in the state which employ more than 1,000 workers.

One of the foundations of the upswing of the Upper Austrian economy -- in addition to local coal and Ruhr coal shipped via water -- we have the huge electric power supply.

The foundry at Linz is Austria's largest and the one at Timmelkam [sic] is Austria's third largest foundry calorywise (Table 6). The state is located in an area which has excellent possibilities for power production: it is bordered by the Inn and Enns, and the Danube runs through it. Several plants along the Inn and Enns have been completed; new plants have been and are being built at Braunau on the Inn, Rosenau on the Enns, and Jochenstein on

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the Danube. The Danube and Traun represent huge and important power reserves; the storage power plant is available via a short distance. The Central European 200 kv common power line crosses the state; when necessary this line can establish cooperation with foreign power plants.

The Salzkammergut area draws domestic and foreign tourists and is closely connected with the Salzburg tourist area.

IV. Government and Population (Table 10)

Upper Austria is divided into 17 administrative districts: 2 city districts (City of Linz, City of Steyr) and 15 rural districts.

In addition to the State capital, the following towns have more than 10,000 inhabitants: Wels, Steyr, Bad Ischl, Gmunden, Braunau on the Inn, Ebensee, and Ried in the Inn District.

In the Alpine Foreland the 4-cornered and 4-sided farm compound are the basic farm house types. In the Alpine area the strip of land between the Traun and the Alm separates the Upper Austrian-Salzburg single-unit house in the W from the bunched compound on the E. Along the Salzburg border the single-unit house spreads to the Innviertel area. In the northern and central Muehviertel area the 3-sided compound prevails; the 4-cornered compound predominates along the Danube (Figure 5).

The Upper Austrian dialect belongs to the Middle Bavarian group.

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BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951

Employed people	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
533,000	39%	39%	11%	4%	4%	2%	-	1%
Occupational Subdivision of the Population	26%	39%	10%	3%	3%	1%	14%	4%

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Compare and compile:

Exclusive farming regions and forest areas. The state's natural resources (Table 5). Major industries. Transportation hubs. Important power plants (Table 6). The percentage increase of the population between 1934 and 1951.

Lower Austria

Area: 18,370 sq km; population: 1,250,400 (1934: 19,301 sq km and 1,509,100 inhabitants); relative population density: 68 (Table 10).

I. Location (map exercise)

Trace the state and national boundaries; list neighboring states and countries: list rivers forming boundaries. Alpine mountain groups in Lower Austria; mountains forming boundaries. Geological structure (cf. map in atlas).

II. State Sections

In connection with the peace treaty of 1254 Lower Austria was divided into 4 quarters for administrative reasons, i. e., the quarters above and below Mt. Manhartsberg, the quarters above and below the Vienna Woods. This division remained in force until 1853.

1. The Bohemian Massif Part (Waldviertel Area). This is Lower Austria's share of the Bohemian Massif; in the E the natural boundary is formed by the Mt. Manhartsberg Range, for which reason the area is known as the "quarter above Mt. Manhartsberg." In local usage it is called "Waldviertel" for short, since the woods give the area its characteristic appearance, covering 25-30% of the surface in the E and 45-60% in the W (Photo 52).

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Crystalline rocks (granite especially in the W, gneiss and slate in the center and in the E) serve as base of the landscape. The rock structure no longer determines the surface formations, for the mountains were worn down to a rump surface.

The western part constitutes a mountain landscape cut by the Lainsitz and the Thaya, the Kamp and the Krems, and the southern Danube tributaries with their many gorges; various knolls jut out of this area (Mt. Nebelstein, 1,015 m; Mt. Tischberg, 1,073 m; Weinsberg Forest, 1,039 m; and Mt. Ostrong, 1,060 m). In the NW the flat divide between the Moldau and Danube areas (the European main divide between the Atlantic Ocean and the Black Sea) drops to 491 m in the Gmuend trough (Vienna -- Prague railroad line).

The landscape receives its peculiar character from the vast surfaces with their gently cut river valleys, ponds and high moors in the hollows, the odd shapes of the granite blocks (pulpit mountains, rocking stones), and rock seas, i. e., blocks of all sizes scattered over meadows and fields and throughout forests.

Due to the high location (800-900 m average) the climate is raw here and rich in precipitation with long winters and heavy snowfall. Zwettl is one of Austria's coldest places. Large coniferous forests cover a large portion of the area. Farming (rye, oats, potatoes, flax) is handicapped by the peculiarity of this block landscape. The ponds facilitate large-scale fish breeding.

Individual farm compounds and long-drawnout villages (hide villages) grew mostly out of the lumberjack or glassworks settlement. In addition to farming, timber cutting is a source of income for the population.

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As early as during the eighteenth century logging canals and ponds ("Klaus" ponds) were established to facilitate the transportation of lumber to the Aist, the Ysper, and to Weiten Creek.

Lumber is also transported via the branch lines leading from the Franz-Josef railroad line into the area. The Schwarzenau -- Zwettl -- Martinsberg-Gutenbrunn and Gmuend -- Weitra -- Grossgerungs (narrow gauge) branch rail lines establish the link with the market communities along the edge of the mountain area proper from which the roads run S to the Danube, e. g., from Grossgreungs via Arbesbach, from the city of Weitra (population 2,000) and from the city of Zwettl (population 3,800), the administrative center of the middle Waldviertel section.

E of the city stands the Zwettl Cistercian seminary, founded in 1138, a cultural center of the upper Waldviertel area.

The administrative center of the western Waldviertel area of the border city of Gmuend (population 6,400; starch factory). It is the starting point of the branch lines into the northern Lainsitz area (Litschau, Heidenreichstein).

In the NW lies the industrial section of the Waldviertel area. In addition to the local stone industry (Schrems, Gmuend; high quality granite), the glassworks, formerly located in the southwestern Waldviertel section, grew into a full-blown glass industry (Altnagelberg) in the vicinity of the raw material transporting railroad line in the area between Gmuend and Schrems.

Another industry branch is the textile industry in the area of the fortified citíes of Heidenreichstein (population 3,500) and Litschau (population 1,800), Waidhofen on the Thaya, and the city of

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Gross-siegharts (38 plants in the Gmuend and Waidhofen on the Thaya districts). The center of this textile industry is in Gross-siegharts (population 2,700).

The original foundations of this industry were flax cultivation and sheephearding. The former home handicrafts, whose products were marketed by travelling salesmen ("Bandlkramerland"), were absorbed by modern industry.

In the eighteenth century a watch industry developed in Karlstein.

The eastern part of the Waldviertel area, the "Lower Waldviertel," is a rolling plateau at 400 m elevation into which are cut winding valleys (cutoff meander spurs); their steep, wooded and steplike slopes reveal rock walls and many castles.

The forest spreads to the plateau and in places forms large woods. (The clearing of the forest in the old days is indicated by the many place names ending in "-schlag, -reith, -brand, and -gschwendt.") Nevertheless fields occupy about 50% of the surface. The climate is milder; therefore all kinds of grain can grow there, including wheat and small quantities of sugar beets. The industry is confined to a few mills and brick ovens which process the weathering loam of the gneiss and slate. The settlements are of the village commons and road type throughout; they stand along the spring hollows of the side trenches of the plateau, on rubble cones, or on protected high terraces along the main streams. The valleys are favored by the climate (protection against the wind); for this reason the settlements in the valleys developed into summer resorts.

Fortress towns along the Thaya are Raabs, Drosendorf, and Hardegg (population 313), which populationwise is the smallest of the state.

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N of Drosendorf there are abandoned graphite pits; graphite occurs in the gneiss and marble of the Lower Austrian Waldviertel area.

On the plateau grew the town of Geras around the Premonstratensian seminary founded in 1155. Near Langau, N of Geras, there are important lignite deposits in Tertiary sweet watersand and marl. The coal has been mined above ground for a very short time now. Keolin is being mined in Mallersbach, E of Langau.

The administrative center of the eastern Waldviertel area, the town of Horn (population 4,300), lies in a fertile basin, a bay of the Tertiary ocean (Photo 53). The southern edge of the Horn Basin is formed by the plateau of Gfoehl (Horn) Forest (600 m) which is cut into valleys by the tributaries of the Kamp and Krems rivers. The area around Markt Gfoehl is mostly farmland; the trench valleys are wooded. Individual farms are widespread; they grew out of the settlements of the colonists who cleared the forests in the old days.

On the N edge of Gfoehl Forest the Kamp River cuts into the land in tight curves (cutoff meander spurs). There are many castles and ruins in its valley. In a side trench stands the Altenburg Benedictine seminary (1144) which is known for its historical art treasures. The chief settlement of the Kamp Valley is the market community of Gars. Along the lower course the loess cover made possible extensive viniculture around the town of Langenlois (population 4,800) and the market community of Zoebing.

Between Zwettl and Rosenburg the natural landscape of the Kamp Valley makes possible the construction of dam facilities for power production. Here the series of power plants at Ottenstein, Dobra-Krumau, and Thurnberg-Wegscheid is under construction or partly in operation.

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The eastern edge of the Waldviertel area is formed by the granitic Mt. Manhartsberg Range, a shore of the Tertiary ocean. Leitha limestone is being quarried in Zogelsdorf's old quarries.

2. The Hill Country below Mt. Manhartsberg (Weinviertel Area). E of the Mt. Manhartsberg Range and N of the Tulln Plain and the March Plain there is a hilly area which the local population refers to as the "Weinviertel" area for short. The name indicates that there is viniculture in the area which however covers hardly 6% of the total surface but which in some stretches dominates the landscape (up to 50%) and constitutes an important economic factor.

The valleys with their wide floors and water bodies with their gentle gradient as well as the waterless hollows and flat regions give the hill country its characteristic appearance. On the damp valley floors we find mostly meadows; the far-sweeping, terraced, and loess-covered valley slopes bear fields and vineyards; the gravel ridges bear oak brush forests interspersed with stands of red pine. The forest takes up about one-eighth of the surface; large patches can be found in the W (e. g., Hollabrunn Forest, Ernstbrunn Woods) and in the E and SE (Traun Forest, Matzner Woods). These forests furnish wood for barrels and for veneer wood as well as building lumber and firewood.

The area has very little water; place names ending in -"brunn" are characteristic.

The flysch sandstone of the Vienna Woods continues N of the Danube in several ranges (e. g., Mt. Bisamberg Range) which point NE; these ranges submerge along the line Karnabrunn -- Niederkreuzstetten. Hard Jurassic limestone, which even reveals karst

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formations on a small scale (dolinas, karst springs) form a remarkable series of buttes (photos 54, 55) from Ernstbrunn to a point N of Nikolsburg.

In some parts they form massive, only partly forested ridges with broad plateaus and knolls, such as the Leiser Mountains (Mt. Buschberg, 492 m); in other parts they rise out of the surrounding area in the form of cliff-shaped rocks, such as the Staatzer and Falkensteiner castle hills.

In this otherwise limestone-poor area they make possible the production of burned lime and highway gravel.

The mild and dry climate and the loess form the foundations of the local viniculture which spreads throughout the entire area with the exception of the plains but which in some places is particularly abundant, e. g., along the Mt. ~~Manhartsberg~~ Range. The centers of this wine-growing area are the towns of Maissau, Eggenburg, Retz, and Markt Pulkau.

Maissau (population 800) is one of Lower Austria's six towns with a population of less than 1,000 inhabitants; Markt Pulkau (population 1,500) is larger than the town of Schrattenthal (population 400). The city of Retz (population 3,300) has large wine cellars with several stories below the city square. The walled town of Eggenburg (population 3,700) is known for its Krahuletz Museum. Krahuletz was a famous collector of geological, prehistoric, and folkloristic objects which he picked up in the surrounding areas. This collection is a world famous study center.

Along the Pulkau River viniculture caused a great increase in the population density; along a 25 km long stretch we find 18 major

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settlements (population density over 230), among them the railroad hub of Zellerndorf, the market community of Haugsdorf, and, at the foot of Mt. Buchberg, the market community of Mailberg, the oldest property of the Order of the Maltese Knights in Lower Austria.

Near Ernstbrunn (population 2,400; farm machinery plant) the Jurassic limestone of the Leiser Mountains is broken up into gravel and building lime.

The centers of viniculture in the hill country E of the buttes are the town of Poysdorf (population 3,100) and the market community of Falkenstein. On the southern edge of the hill country we come to the end of the wine-growing region. Here too we find a series of closely spaced settlements, chief among which are the market communities of Wolkersdorf (population 2,700), Blockfliess (1,500), Auersthal (1,700), and Matzen (1,500). Stillfried is known for its prehistoric and early historic finds.

In addition to viniculture, agriculture (all kinds of grain, maize, fodder plants, especially sugar beets) and animal husbandry are important to the economy. Pure farm areas are the plains in the N and E. The border town of Laa (population 5,300; bitter water spring, mills) is also important.

Animal husbandry is confined to stable feeding since there are no large pastures (milking). The Weinviertel area ships large quantities of milk to Vienna.

Among the local industries of the Weinviertel area we can list the production of sugar in the factories at Duernkrut and Hohenau (population 3,900), distilleries, vegetable processing (Retz cucumbers), brick ovens (loess and loam), lime kilns, and mills.

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Of the mineral springs in eastern Weinviertel area only the one in the market community of Pirawarth (iron-containing baths) became better known.

The discovery of petroleum decisively affected the economy and appearance of the eastern Weinviertel area; these deposits extend in a wide strip from Bernhardsthal via Zistersdorf into the northern March Plain (Photo 56).

The fertile soil and viniculture caused the area to be settled rather densely. The settlements are located in the radius of the ground water either in the spring hollows or along the rivers. The gravel plateaus on the other hand are not inhabited.

The original house type in the entire area is the longitudinal, L-shaped or 3-shaped farm compound; many of the houses have vine-covered walks ("Tretten"). The settlements are of the road or hide type. The wine cellars, arranged in rows mostly in the loess defiles ("celler lanes"), are characteristic for the area. With the exception of the dairy farms, there are no individual settlements. The administrative center of the western Weinviertel area is the city of Hollabrunn (population 6,000); in the eastern part it is the city of Mistelbach (population 5,200; farm machinery).

3. The Alpine Foreland. In Lower Austria the Alpine Foreland lies at an elevation of 400-200 m. It is flatly sloping, rolling hill terrain crossed by many brooks; agriculture gives the soil cover its characteristic appearance: grain ("little grain" farmer), fodder crops for stable feeding of the large numbers of cattle, but no viniculture; large cider orchards surround the settlements and individual farms ("Mostviertel" area). Milk is processed in large dairies (e. g., Mank).

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The arable areas take up 50-60%, the gardens (orchards) 3-4%, meadows (on impermeable clay marl) 20%, and woods 12-15% of the total surface area. The woods, mostly coniferous, in general form small patches; the terraces of the rivers are also wooded. The frequent occurrence of the bunched village as one of the oldest settlement forms proves that the Alpine Foreland is an old settlement region. In the eastern and middle parts the 3-sided compound predominates, while the imposing 4-cornered compound predominates W of the Pielach, mostly as individual settlement in the midst of large land holdings.

In addition to agriculture, industry is significant in the Alpine Foreland. The Alpine area supplies industry with raw materials (iron, woods). Industry is also favored by the fact that the Alpine Foreland is traversed by the Western Railroad and the Vienna -- Linz federal highway and by the fact that it touches the Danube region. The town of Haag (population 4,500; brick oven), the market community of Seitenstetten with its Benedictine seminary (art and cultural treasures) founded in 1109, and Aschbach (large dairy) lie in a pure agricultural region. The rail hub St. Valentin (population 7,100;farm machinery) belongs to the industrial region of Steyr; the rail hub of Amstetten (population 11,300) belongs to the Waidhofen industrial area. Cardboard and paper are being produced in Kematen and Hausmening near Ulmerfeld. The market community of Wieselburg on the Erlauf River (population 2,200; brewery, saw factory) has industrial plants.

The largest industrial town of the Alpine Foreland is St. Poelten (70 sq km, population 40,200), which is also Lower Austria's largest city.

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St. Poelten is a city with its own charter and bishopric. It has many industry branches, including Austria's only celanese plant (artificial silk), machine plants and iron foundries, wood processing, candle, soap, and paste production, textiles, and a main repair shop of the Federal Railroads. This industrial district extends over the St. Poelten "Steinfeld" Plain to the S (thread factory in Harland) to the market community of Wilhelmsburg (population 5,600), to the N up to the city of Herzogenburg (population 4,700) with its Augustinian canon seminary (founded in 1112; art treasures). W of this city brown coal is being strip mined at Statzendorf. The center of the farm region E of the Traisen River is the market community of Neulengbach (population 2,300); to the NE brown coal mining has been begun recently.

4. Lower Austria's Alpine Part

(a) The Lower Austrian Limestone Alps and the Flysch Zone.

The landscape character of the Alpine region corresponds to the zones of the North Alps which are here represented by the Limestone High Alps, the Limestone Forealps, and the Flysch Alps (Photo 57).

Lower Austria's Limestone High Alps include above all the limestone boss of Mt. Rax (2,007 m), Mt. Schneeberg (2,075 m), and Mt. Oetscher (1,892 m) (Photo 58).

Mt. Rax and Mt. Schneeberg are separated by the deep valley of the Schwarza River (Hoellen Valley). From there a cable car leads up Mt. Rax; at 1,538 m it reaches the lowest of the 3 plateaus; the highest point is Mt. Heukuppe.

Mt. Schneeberg also has several plateaus. On one of them, at 1,738 m elevation, the cogwheel railroad from Puchberg has its terminal. The highest peaks (Mt. Klosterwappen, 2,075 m; Mt. Kaiserstein, 2,061 m) lie along a narrow ridge surrounded by the

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plateaus of Mt. Kuhschneeberg in the W and those of Ochsenboden and Gahns in the E. Both mountains reveal karst formations (dolinas, caves). The powerful springs at the foot of Mt. Rax and Mt. Schneeberg are caused by the occurrence of Werfen slate; their water is collected in the Hoellen Valley and routed to Vienna via the First Vienna High Mountain Spring Water Pipeline.

Mt. Oetscher is called the "Northern Cape of the Austrian Limestone Alps" because of its advance position which places it in the area of the Limestone Forealps. It forms a 12 km long, narrow ridge with a small plateau at the peak; it juts out of its surrounding forest belt with its steep walls. The deeply cut trenches of the Erlauf ("Tormaeuer") and its tributaries (e. g., Oetscher trenches), like the ice cave below the Oetscher ridge, are tourist attractions. The 1.2 km long "Geldloch" cave with its 410 m deep shaft is also noteworthy.

The low limestone bosses, e. g., Mt. Duerrenstein, Mt. Gippel, and Mt. Goeller, also have high alpine characteristics: partly there are extensive plateaus with flat knolls, steep walls, dropping into the deeply cut, often gorge-like valleys of the nearby rivers, and karst phenomena (clefts, gorges, dolinas, caves, surface water shortage).

To the N in a grid formation we find adjoining the Limestone Forealps with their ridges and knolls which gradually get lower and lower. The naked rock recedes increasingly and the steep slopes are covered with dense coniferous forest. Narrow and wide sections alternate in the valleys. The water-rich rivers with their considerable gradients favor the development of industry (Photo 59).

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In the E the Limestone Alps and the Flysch Alps precipitate abruptly toward the Vienna Bay. The rim mountains from the Sierning Valloy in the S to the Liesing Valley in the N are called the Thermen Alps.

Some parts of the Alps are tourist areas and are therefore of economic significance, e. g., Vienna's favorite mountains, Mt. Schneeberg and Mt. Rax. The Mt. Oetscher region is also very popular. This includes also the region above the Ybbs (Ois) River in the Lunz area.

The village of Lunz (population 2,300; cardboard factory) lies on an old transportation route which comes from the Erlauf Valley into the Ois Valley via the market community of Gaming (population 4,300). From there the road continues via Goestling and Lassing to the Styrian Salza River and on to Hieflau and Mt. Erzberg. This is one of the iron shipment roads on which the iron used to be shipped to the processing plants in southern Lower Austria. From Lunz we can visit the Lunz lakes; the 2 upper lakes are step lakes embedded in the Mt. Duerrenstein boss.

S of Lunz, along the Lower Austrian-Styrian border, on an area of 3 sq km, stands Austria's largest primeval forest ("Roth Woods"; Forealpine deciduous, coniferous, and mixed forest).

A biological station, famous as research institute, stands on the lower Lunz Lake. Bituminous coal is being mined NW of Lunz. The Second Vienna High Mountain Spring Water Pipeline, which comes from Mt. Hochschwab, passes Lunz. A power plant in Gaming exploits its gradient.

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S of the Mt. Oetscher group on the Styrian-Lower Austrian border lies Lower Austria's second Alpine lake, Lake Erlauf. Its drainage, the Erlauf River, dammed N of Mitterbach in the "Erlaufklause" gorge, and a tributary (Lassing) are used by the power plant of the Mariazell railroad line near Wienerbruck.

The following rail lines lead into this Alpine region: the narrow-gauge Ybbs Valley line from Waidhofen via Opponitz (power plant; small hardware production) -- Grosshollenstein (wood industry, cardboard factory) -- Goestling (sawmill) -- Lunz and on to Kienberg-Gaming (car axle plant, tool plant); the branch line from Poechlarn to Kienberg-Gaming; the electric narrow-gauge line from St. Poelten to Mariazell; the St. Poelten -- Kernhof line; and two branch lines from the Southern Railroad which end in Puchberg and Gutenstein, respectively.

N of the line Waidhofen -- Scheibbs -- Kirchberg on the Pielach -- Altenmarkt on the Triesting the Limestone Forealps, in strongly indented and folded formations, make their transition into the narrow zone of the Flysch Alps which are between 800 and 400 m high. Long, wooded ridges alternate with knolls; the flat slopes are covered with meadows, fields, and small forest belts. NE of the Traisen and the Goelsen there is a compact forest area which extends up to the Danube. The individual farm houses (paired and bunched compounds), which were confined to the valley ledges in the Limestone Alps, now are found also on the lower, flat ridges of the flysch mountains; the scattered settlements are combined into communities under the designations "Gegend" [area], "Rotte" [subhamlet], or "Amt" [office].

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The agricultural situation of the Lower Austrian Alpine region is characterized by the forest economy and animal husbandry. The heavily wooded Limestone High Alps reveal busy forestry activities which promoted the growth of a local industry (sawmills, paper and cardboard production). Animal husbandry is encountered in the Limestone High Alps only here and there; in the Limestone Forealps we find it on a larger scale. In the Flysch Alps we find agriculture in addition to animal husbandry ("little horn [cattle] farmer").

Along the boundaries between the economically different Alpine zones, market communities sprang up such as Waidhofen, Scheibbs, Purgstall, Kirchberg, Lilienfeld, Wilhelmsburg, Hainfeld; these are located in the bulges of the valleys which cut through the Alpine zones and establish good connections with the Alpine Foreland and the Danube Valley.

The development of these market communities was influenced considerably by the widespread iron processing, conditioned by nearby Mt. Erzberg and the rich water power resources. This iron industry gave the name "Eisenwurzen" to the part of the Alpine area between the Erlauf and Ybbs. The center of the oldtime iron trade was the town of Waidhofen (population 5,200).

In the Ybbsitz area we find a few old iron hammers such as were used throughout the Eisenwurzen section in small enterprises in the old days. Its products (scythes, sickles, hoes, and other small farm tools) used to be shipped particularly to the eastern farm states which had little or no iron industry. These small plants were replaced with large plants; the Boehler Plant N of Waidhofen ("Ybbs Valley plant": Boehler Plant and Bruckbacher foundry) are among Austria's largest iron plants.

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Iron processing plants are also located in the Kleine Erlauf Valley in Gresten (hammer works), along the Grosse Erlauf in Neustift near Scheibbs, in Purgstall, and in the Pielach Valley in Kirchberg.

The Traisen Valley from St. Aegyd to St. Poelten is one of Lower Austria's most important industrial regions: St. Aegyd on the Neuwald (wire cable production), Furthof (file plant), Tuernitz (scythe plant), Freiland (cardboard factory), Lilienfeld (sawmill of the Cistercian seminary founded in 1202), Marktl (iron works, aluminum rolling plant, wood fiber plate factory), Traisen (casting plant), Wilhelmsburg (steel goods plant).

The Goelsen Valley, a side valley of the Traisen, also has important iron industry installations in the city of Hainfeld (population 3,700), in Rohrbach, and in St. Veit.

The industrial activity in the Traisen Valley was promoted by the discovery of bituminous coal in the Schrambach area; these lentil-shaped deposits have not been mined in years.

<u>(b) The Central Alps Part</u>

<u>(1) The Mt. Semmering Area.</u> The Semmering furrow can be traced tectonically and petrographically. The softer slate (graywacke zone) which is embedded here between Mt. Rax and the Mt. Wechsel Massif, favors the formation of this trough at 985 m; there we find gypsum, magnesite, and iron ore deposits of which however only the gypsum at Schottwien is now being mined. The peculiar character of the landscape is conditioned by its location between the limestone bosses of Mt. Rax and Mt. Schneeberg in the N and the massive gneiss and mica schist ridges of Mt. Stuhleck and Mt. Wechsel in the S as well as by the fact that the pass leads from a

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valley into the plain. In addition we have the practically mutual interpenetration of various rock types (crystalline, limestone, slate, sandstone) which within this small area caused a rapid alternation between steep limestone walls, fissured rocks, and broad ridges with gentle formations. The beauty of the landscape, the climatically favored elevation, the large forests, and the ready accessibility via road and railroad caused the international mountain air and winter sports resort of Semmering to spring up here (population 1,300), (photos 61, 62).

Replacing the old road which existed as early as during the twelfth century (1160 Spital in "Cere Forest") in addition to the older Wechsel road (Moenichkirchen -- Friedberg), the new Semmering road was built in 1728 and improved by the addition of wide curves in 1841. It runs through Schottwien which lies in the gorge of Semmering Creek.

The railroad from Gloggnitz (442 m) to Muerzzuschlag (679 m) was built between 1848 and 1854 according to the plans of engineer Ghega and was the world's first mountain railroad line; as far as the daring and grandeur of the construction feats along this short stretch are concerned, this line is still first among all mountain railroads. The main tunnel (1,430 m long) is the highest point of the line (898 m). The elevation of Gloggnitz (442 m) is attained again on the S side at the station of Frohnleiten, a distance of 79 km away. In 1952 a parallel tunnel was opened to traffic. It was built 100 m away from the old tunnel under great difficulties caused by the heavily folded and varied rock.

<u>(2) The Mt. Wechsel Area and the Bucklige Welt Section.</u> The upland mountains which consist of gneiss and slate is divided up by

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the tributaries of the Pitten and Rabnitz rivers and attains an elevation of 1,738 m on Mt. Wechsel. The forest extends up to 1,500 m elevation; beyond that there are Alpine pastures on which we find isolated huts, the so-called "Schwaigen." Toward the N, the peaks, called "Riegel," become lower. Between them are flat pieces of land at elevations of 700-800 m, with isolated farms, hamlets, and villages. Woods, meadows, and fields alternate (Photo 63).

In some parts we can detect features similar to those in the Waldviertel area. There are many castles, ruins, and fortified churches, indicating the fact that the area used to be a frontier region.

From the eastern edge of the Bucklige Welt section the Rosalien Mountains push spurs to the N; the 13 km wide Wiener Neustadt Gap separates these mountains from the Leitha Mountains.

The few larger settlements stand along the old transportation routes. The market community for the western part is Kirchberg am Wechsel (population 1,600; cardboard factory) in whose vicinity we find Hermanns cave (alabaster drip stone). In a small basin of the Pitten lies the market community of Aspang (population 2,500, kaolin production, cardboard factory, sawmill); along the divide stands the mountain air and winter sports center of Moenichkirchen (980 m). In the lower Pitten Valley stands the market community of Pitten (population 2,000), the center of an industrial region (paper factory, small hardware); on a western edge step of the valley, near the settlement of Grimmenstein (food production), there is a tuberculosis sanitarium. The most important market community of the eastern part is Kirchschlag on the road into Burgenland.

5. The Vienna Basin

This basin includes, S of the Danube, the Vienna Bay, also

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called Wiener Neustadt Bay; N of the Danube, the March Plain and the area between the cliff zone and the Little Carpathians up to Napajedl N of Goeding (Hodonin) on the March River.

(a) The Vienna Bay

(1) Fringe Areas. The western boundary of the Vienna Bay is formed by the Thermen Alps and the Vienna Woods.

The Vienna Woods form that part of the flysch zone which extends from the source area of the Triesting to the Danube. The geological boundary against the Thermen Alps runs along the line Altenmarkt -- Heiligenkreuz -- Liesing. (In popular usage the part of the mountain fringe between Liesing and Schwechat, consisting of limestone, is considered part of the Vienna Woods.) This is an uplands area which has its peak on Mt. Schoepfl (890 m). Its broad ridges, knolls, and flat slopes are covered mostly by beech forests and a few meadows (Photo 60). In the W coniferous forests predominate. In the valleys we find an alternation of narrow and wide sections. Meadows are found mostly in the valley hollows. The loamy weathering crust, which in part permits the precipitation to seep through, causes landslides and frequent floods after heavy rainfall. In order to protect Vienna against floods, dams were built in the valley basin of Mariabrunn.

The closeness of Vienna was responsible for the dense settlement of the valley running eastward, particularly Wien River Valley. Away from the valley, the area is thinly settled (isolated farms). Here we find forestry and some animal husbandry. The climatically favored eastern edge however is densely settled (viniculture).

In general the Vienna Woods have few transportation routes. The Western Railroad (Rekawinkel saddle), the Vienna -- Linz federal highway (Riedberg saddle), and several secondary roads cross the upland mountains.

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S of the Vienna Woods, between Liesing and Sierning creeks, lies the Thermen Alps, the eastern edge of the Limestone Forealps. They are divided into individual groups by the Schwechat River and its tributaries and the Piesting River; these mountain groups increase in elevation as we go S. The mountains were named for the thermal springs (Baden, Voeslau, Fischau) which occur here along a fault line. The mountains consist mostly of limestone and dolomite. The ridge lines of the mountain ranges are rather unruly, the slopes are steep, but we also find plateaus and walls (e. g., Hohe Wand wall). The rivers break through the fringe zone mostly via gorges (e. g., gorge near Moedling) because the mountain fringe was uplifted somewhat after the rivers had carved their beds.

Near Gruenbach am Schneeberg we find Austria's most important bituminous coal mine (Table 5). S of Berndorf, near Grillenberg, brown coal is being mined. The limestone is being quarried in many places (lime and gravel installations).

The mountains are heavily wooded (coniferous and mixed forests). On the somewhat drier eastern edge the black pine (resin production) predominates. In the valley bulges and basins there is agriculture. The vine grows up to elevations of 400 m (Perchtoldsdorf, Gumpoldskirchen, Baden, Voeslau) on the terraces of the eastern edge, favored by the Pannonian climate.

In the Triesting and Piesting valleys large industrial settlements sprang up in the wide valley sections.

In the Triesting Valley these are Hirtenberg (ammunition, metal industry), St. Veit, Berndorf (metal products), Pottenstine (resin refinery), Weissenbach (press buttons); in the Piesting Valley

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we have Woellersdorf and Piesting (metal and wood processing plants, shoe lasts, resin refinery), Wopfing (iron plant), Waldegg (copper rolling plant), Ortmann E of Pernitz (hat bodies, medical cotton, paper), Gutenstein (wire cables). In addition to the industrial settlements we also find scattered settlements.

The railroad line via Kaumberg saddle connects the Southern Railroad (Leobersdorf) with the Western Railroad (St. Poelten).

In the S the Vienna Bay is bounded to the Semmering landscape, the Bucklige Welt area, and the Rosalien Mountains.

Between the Wiener Neustadt and Bruck gaps rise, like an island, the Leitha Mountains with their slightly undulating ridge line (Mt. Sonnenberg, 483 m) about 150-250 m above the plain along the Leitha River. These mountains drop about 100 m to Lake Neusiedler and the Wulka Plain.

Around the nucleus of slate, gneiss, quartzite, and Triassic limestone, we find Leitha limestone, arranged like a cover; this is a reef formation of limestone secreting algae from the Tortonian sea. At the foot of the mountains there are solidified sand and marl, deposits of the Pannonian inland lake.

On the western and eastern slopes the surf formed terraces of varying width into which are often cut valleys with many gullies.

Leitha limestone is being quarried in many places; in Mannersdorf it is also made into cement; chalk (for writing) is made out of fine-grained lime sand in Muellendorf, W of Eisenstadt. Leitha limestone is ideal for building and sculpturing, many of Vienna's magnificent edifices and art treasures consist of this stone.

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At lower elevations, especially in the E side, the terraces bear vineyards; on the heights we find mostly deciduous forest (oak and beech).

The Leitha Mountains have been a frontier region since olden times. The larger and agriculturally more valuable part belongs to Burgenland. Settlements ring the foot of the mountains. Despite their low elevations the mountains are an obstacle for W-E traffic; the main transportation routes skirt the mountains via the Bruck and Wiener Neustadt gaps.

The Hainburg hill country, which together with the Leitha Mountains belongs to the Alpine-Carpathian zone, is a crystalline and limestone block cut to pieces by faults and has terraced slopes (Mt. Hundsheimerberg, 476 m). Parts of the hill country are covered with oak forests; brush grows along the slopes which for the most part are bare. The limestone is made into road gravel.

The major settlements of Hainburg and Bad Deutsch Altenburg lie along the fault line of the hill country toward the Danube.

The fringe hills in the N of the Vienna Bay start on Viennese soil with the heights of Schienbrunn and extend toward the Bruck Gap. They constitute uniform gravel plateaus, the remnants of an ice age Danube terrace aggradation; the area is covered with loess and drops toward the Danube in the form of a steep cliff. The Schwechat and Fischa rivers break through this rise in the terrain and divide it into 3 hill groups. Due to the loess cover, fields take up close to 80% of the surface. Only the highest parts bear oak brush forests. Along the fringes there are large marl deposits which supply the large brick ovens (Mt. Wiener Berg, Mt. Laaerberg, Leopoldsdorf).

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(2) The Interior of the Vienna Bay. This is an about 1,600 sq km large plain which dips from SW to NE and is influenced by the Pannonian climate, characterized by summer heat (July mean over 20° C), winter cold (January mean below minus 2 °C), and little precipitation (500-700 mm) (Photo 64).

We can distinguish between 3 climatic sections.

The southern part of the Vienna Bay, the Steinfeld Plain, is a rubble cone of the Schwarza (60 sq km) and the Piesting (80 sq km). Here the water seeps through the permeable gravel ("dry plain"). The area was originally a heath; today it is mostly covered with fields or as for instance between Neunkirchen and Wiener-Neustadt with black pine forests (resin production).

Artificial irrigation made it possible to found Theresienfeld (eighteenth century). Felixdorf (population 2,200) was not founded until the beginning of the nineteenth century.

The Steinfeld Plain and its fringe areas are rich in industry: Neunkirchen (population 9,800; screw and ball chain plants, production of water hoses, dyestuff plant, woollen goods factory), Ternitz (population 8,400; steel plant, file factory), Wimpassing and Traiskirchen (rubber goods factory), Enzesfeld (metal works), Leobersdorf (machine plant), Felixdorf (spinning and weaving plant), Pottendorf (spinning plant), Landegg (rug factory), Voeslau (worsted yarn factory).

The chief settlement is Wiener-Neustadt (city with own charter; population 30,500), Lower Austria's second-largest city.

The city was founded by Leopold V around 1194 for the purpose of protecting the transportation routes meeting there; a naturally protected area was found there in the form of a swamp created by a branch of the Schwarza (Kehr Creek) and by the "warm" Fischa coming

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from Fischau. This favorable position soon made the place into a market community; in the fifteenth century the fortified city was also the seat of a bishop (1477-1784). The favorable ground water situation made possible the construction of many factories (production of iron and metal goods, tank cars, farm machinery, compressors, radiators, zippers; spinning and waving plants, cardboard factory, resin and terpentine oil refinery, and installations for obtaining seeds from coniferous trees). The water arteries were collected for use in the "Wiener-Neustadt navigation canal" (1804) which was used extensively for transportation to Vienna during the first half of the nineteenth century. (Today it ends at Biedermannsdorf; its water feeds mills and plants.) The city is an important traffic hub. The federal highway runs along the "Neunkirchner Avenue" through the "great pine forest" to Neunkirchen.

E of the line Pottendorf -- Ebreichsdorf -- Moedling, where there is no gravel, the ground water comes to the surface through the marl base in the form of numerous little water bodies, veins, and damp meadows. This is the so-called "Wet Plain" (place names ending in "-moos"). The meadows make possible animal husbandry here; as a result of the drainage facilities, arable soil takes up almost 60% of the surface.

The numerous little water bodies are also used by the industrial installations in the area. In this damp plain we also find Laxenburg Castle, located on an island in a lake.

The Wet Plain is joined to the N by an area that is mostly fertile farm and vegetable country. The vicinity of the metropolis however caused many industrial settlements to spring up in the valleys of the Schwechat, Fischa, and Leitha.

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The administrative center of this densely settled area is the city of Bruck on the Leitha (population 6,600; sugar factory). Other factory towns are the market community of Mannersdorf at the foot of the Leitha Mountains (cement plant, limestone quarries, sulfur spring), the city of Schwechat (since 1938 a part of Greater Vienna) (population 8,400; beer brewery, iron and machine industry), the market community of Fischamend (population 2,800; metal products industry).

The textile industry is very strongly represented in this area: Guntramsdorf (since 1938 part of Greater Vienna), Ebreichsdorf (felt hats), Gramatneusiedel (since 1938 part of greater Vienna) (Marienthal spinning plant), Ebergassing (since 1938 part of Greater Vienna) (carpets), and Schwadorf (1938, Greater Vienna). There is a glass factory in Moosbrunn and a salami factory and a paste goods factory in Himberg; both of these places were incorporated into Greater Vienna in 1938.

The Vienna Bay is one of Austria's economically most important regions. The area is traversed by many railroads. The most important of these are the Southern Railroad, the Aspagn railroad, the Eastern Railroad, and the electric local line Vienna -- Berg.

(b) The March Plain (cf (f) below)

(c) The Area between the Cliff Zone and the Little Carpathians (cf Section I. The Landscape; Major Landscape Sections; B. The Foreland in the East, above)

6. The Danube Sections in Lower Austria

From the mouth of the Enns to Sarmingstein only the right bank of the Danube belongs to Lower Austria. A more or less wide floodplain

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belt accompanies the stream to Ardagger. Its outhern edge rises over a step to a rather broken-up part of the Alpine Foreland. There, on the Linz -- Vienna federal highway, we find the settlement of Strengberg at an elevation of 350 m. The only settlement in this valley section which lies directly on the Danube is Wallsee, located on a granite plateau about 50 m above the river.

(a) The Strudengau Section This is the section of the Danube Valley between Aradagger and Ybbs (see Lower Austria; 3. The Alpine Foreland). The part of the Bohemian Massif located to the S of this section is called the Neustadl Plateau. It reaches its highest point on Mt. Hengstberg at 569 m.

(b) The Nibelungengau Section. This is the part of the Danube Valley from Ybbs to Melk.

Here the Bohemian Massif breaks off to the Danube on the left bank in the form of several steep steps. About 200 m above the river stands the pilgrimage place of Maria Taferl, visible from afar.

Gneiss and granite is visible also on the S side, e. g., on Mt. Hiesberg (553 m) near Melk. A gneiss rock bar and the mouth of the Ybbs River caused the Danube River curve between Ybbs and Saeusenstein.

In the Nibelungengau section we also find the 3 towns of Ybbs, Poechlarn and Melk.

Ybbs (population 4,600; leather and cardboard factories, sawmill, umbrella rods) is at a disadvantage compared to the other 2 cities due to the lack of a direct rail connection; the ferry to Persenbeug (castle; Danube power plant under construction) on the opposite bank leads to the

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road into the Strudengau section. The Erlauf Valley Railroad branches off at Poechlarn (population 2,800; base of the old Roman Danube flotilla, the old "Bechelaren" of the Song of the Nibelungs; hemp and jute industry, leather factory). The Danube ferries at Poechlarn and Melk carry the traffic from the Waldviertel area. The occurrence of clay earth ("Tachert") around Poechlarn promoted the growth of an important ceramics industry (Krummnussbaum: clay pits, stone and clay article production; Kleinpoechlarn: ceramics industry).

(c) The Wachau Section. At the entrance to this section we find Melk (population 2,700) and, towering over it, the Benedictine seminary famous for its historical and art treasures; the magnificent baroque edifice is the work of the architect Jakob Prandtauer and his brother-in-law and pupil Josef Munggenast of St. Poelten (Photo 67).

The banks of the Wachau section have been cut up into hilly terrain by the tributaries of the Danube; this terrain includes Dunkelsteiner Forest (712 m) and the massifs of Mt. Jauerling (959 m) and Mt. Sandl (722 m). Below Spitz the valley opens up and becomes somewhat wider. The slopes are terraced. The gradually more compact loess cover on the left bank and the warmer summer weather promoted the growth of extensive vineyards and orchards (apricots) which, in addition to the wooded slopes and weathered rock groups, considerably contributed to the characteristic appearance of the winding valley section. The medieval name "Wahowa" originally was applied only to the area around Spitz (Photo 68).

In the Wachau section the main settlements sprang up on the left bank where the old connecting routes from the Waldviertel area meet the Danube (ferries); these settlements are the market communities of Spitz (population 1,700) and Weissenkirchen (population 1,000); the little town of Duernstein (population 600, Photo 69) is famous for its art treasures.

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Austria's Danube Valley has no more scenically beautiful section than the Wachau section and no more scenically beautiful point than Duernstein. The little town stands on a rock step between the river and the mountains, its houses line up along a single, narrow road. Seen from the river the whole picture unfolds in its most attractive aspect. On mighty rock bastions, whose steep walls are washed at the bottom by the river stands the huge renaissance castle on the W end and next to it the complex of the former Augustinian seminary. The steeple of the old seminary church which towers over the little town is one of Austria's most beautiful baroque towers. It is the work of the Viennese architect Matthias Steinl. The town picture ends calmly with the long structure of the former Clarissinian cloister. Behind it rises the rocky castle hill which bears the ruins of the old Kuenringer Fortress. From the ruins the weathered city walls lead down the steep slopes to the settlement enclosing it with huge arms so to speak.

The Wachau section opens into the Tulln Plain in a wide crater. Here the bridge towns (road and railroad) of Krems and Mautern form an almost continuous settlement group (Photo 70).

Krems (city with own charter; population 20,300) today also includes among others the former town of Stein and the former market community of Rehberg. Krems is important because it is an administrative center and the site of educational institutions and because it is an old market community and wine-trade center as well as an industrial town (production of fin metals, leather and shoe factory; tobacco factory, mustard factory). The landmark of the Wachau section exit is Goettweig, Lower Austria's oldest Benedictine seminary (1083) situated on a granulite hill SE of Mautern (population 1,600; Roman settlement, St. Severin).

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(d) The Tulln Basin (Tulln Plain). This section extends along the Danube and its branches and is covered with floodplains and meadows; on the adjoining dry area we find field cultivation.

The loess-covered Wagram section rich in springs bears vineyards and is densely settled; this is also true of the southern fringe while the actual plain contains rather few settlements; there are only 5 settlements along the Danube itself, located on the high banks. The good ground water conditions make possible vegetable cultivation in addition to grain and sugar beet cultivation as well as cabbage and potato crops.

On the higher S bank of the Danube a gravel terrace between the mouths of the Grosse Tulln and Kleine Tulln rivers, stands the town of Tulln (population 5,400; sugar factory). At this point the road and railroad cross the stream.

Of the settlements in the Wagram section, the city of Stockerau (population 11,100) has important industrial installations as a result of its favorable transportation situation (production of machines and pumps, mining equipment; glass spinning plant). On the S fringe the market community of Traismauer (population 3,100) is important (factory producing Christmas tree decorations, metal products plant). N of Mossbierbaum there is a large chemical plant (petroleum refinery).

(e) The Vienna Gap. In this area (Photo 71) we find the cities of Korneuburg and Klosterneuburg. Korneuburg (population 7,900; shipyard, pen factory, pharmaceutical and chemical industry, petroleum refinery) is also a Danube port. Klosterneuburg (since 1938 part of Greater Vienna) (population 14,000) is an old wine trade center; its Augustinian canon seminary is important for its artistic and historical treasures.

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Korneuburg used to be a part of Klosterneuburg; the floods of the Danube pushed it to the safer left bank at the turn of the twelfth and thirteenth centuries. At first called "Neuburg markthalben" -- to distinguish it from "Neuburg klosterhalben" -- it was called "Kornewnburg" at the end of the fourteenth century which in daily usage became Korneuburg. ("Kar" or "kor" signified a duty to be paid to the prince from local grain trade.)

(f) The March Plain. This is the lowest area in Lower Austria; on the March River mouth the Danube level is at 133 m. This is a peneplain with subsequent aggradation by the formerly greater predecessor of today's Danube; the old bank edges are still preserved in the landscape as "Wagram" section. The March Plain dam was built to protect the southern area against the floods of the Danube and March rivers. The floodplain field landscape adjoins the Danube floodplain itself; here the farm country covers larger surfaces which are well settled. In the interior the floodplain fields gradually make the transition into the actual field landscape.

The chief settlement of the southern March Plain is the walled town of Grossenzersdorf (population 2,500, since 1938 part of Greater Vienna).

The interior of the March Plain between the Eastern and Northern railroads is in some stretches very dry and not at all fertile as a result of the stony and sandy soil. This heath landscape is characterized by windborne sand stretches and narrow strips of woods consisting of black pine and birch (shelter belts against flying sand). The number of settlements is therefore rather small in this part but the many deserted sites indicate that the section used to be much more densely settled in the past.

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The northern and northeastern parts of the March Plain reveal mostly deep humus soil in the alluvial section of Russ Creek and Weiden Creek and is therefore mostly arable land. Grain, maize, early potatoes, vegetables, and sugar beets are grown there; the latter are processed in the Leopoldsdorf sugar factory.

As a result of the dry, warm soil, the crop in the March Plain comes earlier than in the other sections of the state.

In the northern March Plain the drillings for petroleum and natural gas are very productive (Matzen, Auersthal, Aderklaa).

The administrative center is Gaenserndorf (population 3,400). The town of Marchegg (population 2,300) founded by Ottokar II never managed to fill up the entire area enclosed by the town walls. The large switching station of Strasshof lies on the Northern Railroad between Deutsch-Wagram (population 4,000) and Gaenserndorf. During the past 40 years a settlement of 2,700 people grew around this station out of a dairy.

(g) The Hungarian Gap (Hainburg Gap). After the mouth of the March River, the Danube, on a stretch of 10 km, becomes a border river and flows through the Hungarian Gap, the narrows between the Little Carpathians (Mt. Thebner Kogel, 514 m) and the Hainburg Hills (Mt. Hundsheimer Berg, 476 m). Hainburg, Austria's easternmost city is a border fortification dating back to the twelfth century (population 7,000; tobacco factory). On the NW foot of the Hainburg Hills stands the iodine-sulfur bath of Bad Deutsch Altenburg. In the area of Deutsch Altenburg and Petronell we find preserved the remnants of the old Roman fortress and the civilian settlement of Carnuntum; the "Heathen Gate," the 2 amphitheaters, the excavations of living quarters, and the "Carnuntinum" Museum are points of interest (Photo 72).

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III. Economy

Lower Austria has many and varied natural resources, some of which are of great importance to Austria's overall economy (Table 5).

At the present Austria has no control over its rich petroleum resources. Austria's largest bituminous coal deposits are being mined in Gruenbach. The lignite coal of Langau was first mined in 1947. Most of the coal mined is used up in the Vienna power plants. Of significance are also the mining of graphite, gypsum, kaolin, and glass and (Zelking) and the production of caustic lime, cement (the Mannersdorf plant is the largest of its kind in Austria), natural stone, gravel, and bricks. The siliceous earth deposits on the eastern edge of Mt. Manhartsberg are unique. Barytes were discovered on Mt. Sonnwendstein.

The health resort of Baden is open again. The iodine-sulfur baths at Deutsch Altenburg are again very popular.

About two-thirds of the agricultural area consist of arable land. In 1952 this area was percentagewise twice as large as the overall Austrian average.

Since Lower Austria is the largest federal state it also heads the list of the other states with respect to its agricultural products.

Lower Austria has over 30 industries which have a production capacity of 30% of Austria's industries. Lower Austrian and Styrian sugar beets are being processed in the 5 factories in the state. Quite considerable quantities of potatoes are being used for the production of alcohol and potato starch. The many branches of the food industry and luxury food industry are partly dependent on raw materials imports from abroad.

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The area of meadows (20%) and pastures (5%) within the total agriculturally exploited area is below the overall Austrian average. The mountain pastures (0.5% of the total area) are rather small.

The large number of cattle (1952: 48 head per 100 inhabitants) is made possible by stable feeding and is concentrated on milk and meat production. Lower Austria in 1952 produced roughly one-third of Austria's total milk supply.

The forests (34%) do not quite come up to the Austrian average.

Lumber is processed in about 1,000 sawmills, 100 of them being major establishments, in which more than one-fourth of Austria's sawmill workers are employed. However only about one-tenth of the cut lumber is exported. The number of wood processing plants is also comparatively small (furniture, plywood and fiber plates, wooden houses, wood products). Wooden ships are being built in Aggsbach-Markt.

The paper, cellulose, wood pulp, and cardboard industry employs roughly one-fourth of all Austrians working in this field.

The power plants are very important in the further development of the state (Table 6).

Only about one-third of the power consumed can at this time be produced in the state. Medium-capacity continuous-operation power plants are at Opponitz and Gaming. The storage plants at Wienerbruck and Erlaufboden are of less importance, as is the natural gas power plant in Neusiedel on the Zaya. Of the 3 storage plants of the Kramp Valley power plant chain, the Thurnberg-Wegscheid and Dobra-Krumau plants are now in operation.

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The closeness of Styrian iron, the large rivers from the Alps, and charcoal for many centuries formed the foundations of a large iron and metal industry. The times have bypassed the small plants (mostly in the Lower Austrian "Eisenwurzen" region) and in many cases did away with them. They were replaced in certain districts with large industries (Boehler Works at Weidhofen on the Ybbs, plants in Ternitz, Krems).

One-third of Austria's foundries can be found in the districts of Baden, Wiener-Neustadt, and Neunkirchen. Large plants of the metal industry are based on Enzesfeld, Berndorf, and Marktl (Traisen Valley). The most important large enterprises of the machine, steel, structural steel, and motor vehicle industry are located in St. Poelten, Stockerau, and Wiener-Neustadt. The large plants are surrounded by small and medium plants turning out a variety of products. In 1952 all enterprises together employed 20,000 people.

Lower Austria was one of the oldest textile-producing states of the old Austro-Hungarian Monarchy. Its textile industry is still first among the other federal states by virtue of the number of plants, the variety of products, and the number of employees. It is concentrated in 2 regions: around Baden and to the E of that city, and in the northern Waldviertel area.

The production processes include all phases from spinning to refining. However there are only a few large plants which process the raw material to the finished product stage. St. Poelten has Austria's only artificial silk factory; Wiener-Neustadt has Central Europe's most modern spinning plant (newly established in 1950). In 1952 the textile industry employed about 25,000 people.

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Glassworks existed in the Waldviertel area as early as during the fourteenth century. The 6 plants in Lower Austria today are very important by virtue of the products they turn out (window and marble glass, bottles of all kinds, glass bulbs for electric bulbs and radio tubes, glass wool, etc).

The chemical industry of the state leads that of the other states in the number of employees (more than 9,000), though not in the number of establishments. It is highly varied (rubber processing, petroleum refineries, production of industrial fats, lubricating oils, soap, plant protective agents, artificial substances, medication, etc).

We should emphasize the rubber industry ("Semperit" in Traiskirchen and Wimpassing, today Lower Austria's largest industrial enterprise), the synthetic processing plants, resin processing; Austria's only glue factory is in Rannersdorf, the only linoleum plant is in Brunn am Gebirge, the only wax cloth plant in Traiskirchen.

The petroleum industry (extraction and processing) employs over 6,000 people.

In 1951 Lower Austria took second place after Upper Austria with respect to the number of industrial enterprises (1,993) and after Vienna in the number of employed.

Tourist trade. Lower Austria has many scenic attractions and historical sites. Mts. Semmering, Rax, and Schneeberg and the Wachau section are special points of interest. As a result of the existing situation, the state has since 1938 been dependent mostly on domestic tourist trade.

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The 6,000 foreigners who visited Lower Austria in 1950 amounted only to one-tenth of the number of foreign visitors in 1937.

IV. Government and Population (Table 10)

The state is divided into 4 cities with their own charters (St. Poelten, Wiener-Neustadt, Krems, and Waidhofen on the Ybbs) and 18 administrative districts.

Of all federal states, Lower Austria has the largest number of cities and towns (more than Upper Austria, Salzburg, and Styria together) and half the number of market communities in Austria; 18% of Austria's population live in Lower Austria.

The Lower Austrian dialects belong to the Middle Bavarian group. The "ui" dialect, found in the Waldviertel and Weinviertel areas, is also a branch of the Middle Bavarian group and has no connection with the "Frankonian" dialect.

BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

Employed People	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
617,000	47%	35%	9%	3%	3%	2%	-	1%
Occupational Subdivision of the Population	32%	34%	9%	3%	3%	1%	15%	3%

Compare and compile:

Natural resources and locations (Table 5). Farming, wine, and forest regions. Comparison of mountain pasture areas in Lower Austria with those in Tirol, Vorarlberg, and Salzburg (Table 4). Industrial regions. Large industries and location. Sugar factories. Transportation hubs of the various railroad lines. Percentage of population decrease 1934-1951.

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Burgenland

Area: 3,960 sq km; population 276,100 (1934: 299,400); relative population density: 70 (Table 10).

Burgenland is Austria's youngest federal state. It was awarded to Austria in the peace treaty of St. Germain in 1919 ("German Western Hungary") and handed over to Austria on 30 August 1921 without the Oedenburg area. The state includes the western, mostly German-speaking parts of the Hungarian counties of Wieselburg (Moson), Oedenburg (Sopron), and Eisenburg (Vasvar). On the basis of these counties, the new state was called Burgenland.

As a result of an Oedenburg area plebiscite not provided for in the peace treaty, Oedenburg and the 8 surrounding communities with a German majority remained in Hungary. With the loss of this city, the new federal state also lost its natural center.

I. Location (map exercise)

Federal states and other countries bordering on Burgenland. Rivers and mountains forming the boundary. Note that the international border in the southern part of the state crosses the Pinka road 8 times. Measure the shortest W-E width of the state. The Alpine part of the state. River regions in the state. Geological structure (cf map in atlas).

II. State Sections

Two spurs of the Central Alps jut out far to the E: they are the Oedenburg and Guens hills which divide the state into 3 parts: the northern, central, and southern parts.

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1. Northern Burgenland. The natural boundary in the W is formed by the Hainburg Hills, the Leitha Mountains, the Rosalien Mountains, and the Oedenburg Hills. The western boundary does not constitute any sort of divide for the climate, botany, and population for it is connected with the Vienna Basin via several cols: the Hainburg, Bruck, and Wiener Neustadt gaps. Lake Neusiedler is of great importance to northern Burgenland. On its western shore, rising like an island, we find the Rust Hills which separate the Wulka Basin from the lake. NE of the lake, from the Hainburg Hills to the Leitha River, the area belongs to the low terrace of the Danube; it is called Heidboden. This area is joined to the S by Parndorf Heath, an aggradation plain of the Danube dating back to the second ice age; the strip of land E of the lake with its many ponds is called Seewinkel. This is a gravel area with loam and sand and belongs to the low terrace of the Danube. Along the southern national boundary extends the swamp area of Waasens (Hansag). With Heidboden and Parndorf Heath, the Upper Hungarian Plain reaches the Leitha Mountains and the Hainburg Hills.

The Leitha Mountains (see Lower Austria; 5. The Vienna Basin) mostly belong to Burgenland. On the climatically favored E side of the mountains the vineyards and orchards (cherries, peaches, almonds, apricots) extend high up the slopes.

The settlements at the eastern foot of the mountains are centers of a large wine region. Their cherry crop is important to the Viennese market.

On the southern edge there is also a large wine and apricot region. There on the lowest terrace we find the present-day capital

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of Eisenstadt (population 5,400), seat of the state legislature, the state government, and the most important government agencies, as well as 2 high schools (Photo 73).

It can be established that during all periods of prehistoric and early historic times, starting with the Young Stone Age, there was a certain continuity in the settlement of the state, mainly along the natural transportation routes. This applies also to the settlement of Eisenstadt and its surroundings; this is borne out by the relics dating back to the Young Stone Age, the Bronze and Iron ages, and the Roman occupation. In the thirteenth century this was the site of the settlement of Wenigmertersdorf (Villa Martini minoris, Hungarian: Kismarton) which in the fourteenth century grew into a fortified market community called "Eisenstadt." The area of the domain of Eisenstadt shared the fate of all the frontier domains of Burgenland. From 1401 to 1622 Eisenstadt was Austrian; then it came into the possession of the Hungarian Count Esterhazy and, like the domains of Hornstein, Kobersdorf, Bernstein, etc was incorporated into the Hungarian state. Only Eisenstadt, through its elevation to the status of a "royal free town" in 1648, was able to escape the jurisdiction of the ruler of the domain. Today the "free town of Eisenstadt," like the "free town of Rust," is a city with its own charter; it has the character of a small German town and has a few beautiful baroque buildings. Josef Haydn is buried in the Kalvarienberg Church of Ober-Eisenstadt; he was the orchestra conductor of Prince Esterhazy. There too we find the birthplace of the Austrian anatomist Josef Hyrtl (died 1894).

Below the Young Tertiary layers (clay and sand) of the Wiener Neustadt Gap there are brown coal deposits (lignite coal) rather close

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to the surface; mining was resumed in 1945 near Neufeld on the Leitha, Stinkenbrunn, and Poetsching (strip mining).

These deposits had been tapped in earlier days in various places, particularly near Zillingdorf. In an abandoned mine near Neufeld, there developed an almost 1.5 sq km large and 35 m deep lake.

Neufeld (population 2,400) with its jute factory (sacks, etc) and the chemical plant (chemical auxiliary agents for cooling plants, vat sulfur, etc) is still under the influence of the industrial area of the Vienna Bay; this is partly due to the closeness of Ebenfurt.

The Rosalien Mountains rise out of the plain near Neudoerfl (textile factories); they reach their peak on Mt. Heuberg (746 m) and the Rosalien Chapel and extend to the saddle at Sieggraben. The border between Burgenland and Lower Austria runs along the broad ridge from which side ridges branch off. The upland mountains here consist of crystalline rock (gneiss, mica schist); in places we can also find dolomite and limestone (quarries, lime kilns). The mountains are covered almost exclusively with coniferous forest and are practically uninhabited (old frontier zone). The E side has a sunny, mild, and uniform climate which make rich fruit cultivation possible. A single orchard extends for instance from Sauerbrunn (mineral spring) to SE of Mattersburg.

Here we find apples, pears, cherries, strawberries, and chestnuts. Centers of fruit cultivation are Wiesen and Forchtenau.

The settlements nestle against the slopes of the lateral valleys. High above this strip of land, on a limestone rock, stands one of the most beautiful of the many castles of the state -- Forchtenstein Castle.

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The market community and railroad station of this region is the town of Mattersburg (population 3,800; sawmill, electrotechnical plant, high school). The cattle markets, particularly the horse markets, are of importance in this area.

The Oedenburg Mountains extend from Sieggraben saddle toward E (Mt. Brentenriegel, 605 m). They are heavily cut up and wooded. The nucleus of these mountains is formed by crystalline rock which is enveloped in ocean and river deposits (gravel, sand, clay) containing coal bearing layers.

The brown coal (glance coal) is being mined in Hungary near Brennberg and, most recently, in shafts at Ritzing in Burgenland. The deposits, located with the help of deep drillings, in the Rosalien Mountains are worth mining and await exploitation.

The Wulka Plain, one of the bread baskets of the state, extends between the Leitha Mountains and the Rust Hills. Large farm holdings take up most of the space here, mostly with grain and sugar beet cultivation; however maize, potatoes, fodder plants, tobacco, cherries, and apricots also grow extremely well here. Viniculture is found in certain favored places. The market community of Wulkaprodersdorf, a Croatian settlement, is a railroad and highway hub. The Siegendorf sugar factory processes most of the sugar beet crop of the state.

The Rust Hills, covered almost entirely with vineyards, extend from Schuetzen am Gebirge to the southern edge of Lake Neusiedler and are crossed by the national border. Their structure is similar to that of the Leitha Mountains. Leitha limestone is being quarried near St. Margareten (50-60 m thick layers) and Oslip. The population of the fringe settlements derives its main income from viniculture and fruit

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cultivation which are favored by the climate particularly on the E side of Lake Neusiedler. The main settlement of the well-known wine region is the free town of Rust (population 1,600; Roman settlement, "royal free town" since 1681).

Lake Neusiedler, whose southernmost part belongs to Hungary, lies in the lowest area of the western Hungarian lowlands and thereby also of Burgenland and Austria, probably in a geosynclinal basin. It is a steppe lake (Photo 74).

It has only 2 small tributaries, one of them, the Wulka, and no regular drainage. The water depth is small (0.3-1.2 m). The base of the flat basin is covered with a thick mud layer; below it there is mostly Pannonian marl. According to certain calculations, the annual evaporation amounts to 1,500 mm; the average precipitation is only 622 mm. For this reason the water also contains salt. Most of the water volume comes from the ground water stream of the surrounding area, above all from the gravel and sand of the Seewinkel section. Water welling to the top in the winter creates certain ice-free places.

There are no major tributaries; for this reason the lake is very sensitive to changes in the weather; in this connection it would seem that the precipitation fluctuations play a smaller role than the changes in temperature and wind; the latter, after all, determine the degree of evaporation. For this reason the height of the water level fluctuates constantly. Abnormal weather conditions however exert their influence only after 5 years, since the extensive ground water stream from the surrounding areas has a delaying effect. Data from the late Middle Ages indicate that the water level must have varied greatly even then. The chronicles tell of an almost complete

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drying out (1740, 1868) and considerable high water (1786; 515 sq km). Around 1930 the lake's water level again attained its average figure so that several projects for the development of tourist trade were launched and partly completed. In 1934 the level dropped again strongly; nowadays one can note a slight rise. The number of fish also depends on the water level.

A drainage channel was dug in the form of the 30 km long "Einser Canal" to the Rabnitz River, completed in 1895, which is used whenever the water is at the corresponding level. The planned drainage of the lake has not been achieved.

The lake surface is ringed by a reed belt which is one to 3 km wide; a sand beach can be found only near Podersdorf. Due to the great fluctuations of the water level, the meadows along the shore are very swampy.

Reeds are processed industrially (mats and plaits, building boards) in Purbach, Oggau, and Neusiedl; raw reeds are also exported. The damp meadows and the young green reeds make it possible for the "lake farmers" to keep a considerable number of cattle.

There is rich birdlife in the reed belt; it changes according to the time of the year. To protect birdlife, several strips of land in the Seewinkel section have been declared bird sanctuaries. The Institute for the Scientific and Economic Exploration of Lake Neusiedler and its biological station in Neusiedl handles all problems concerning the lake.

The lake basin is about 300 sq km large; its water surface is today estimated at about 160 sq km. The lake is a major factor affecting the climate of the area; it brings about an early spring and a long autumn.

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The landscape E and NE of the lake is the bread basket of Burgenland. With the exception of Parndorf Heath it is completely flat and almost devoid of woods. The climate is highly continental. The area belongs to the hottest (Neusiedl am See) and poorest in precipitation (Tadten, 55 cm) of Austria's regions. Large land holdings and large and medium farms predominate. The settlements are mostly far apart but have rather large populations. Even some dairies with their farm buildings develop into small settlements which sometimes have their own schools.

In this easternmost region of Austria we find the Seewinkel section which has a quite peculiar character of its own -- totally different from conditions in the rest of Austria. There are large ponds with flocks of geese, vast pastures with herds of cattle, horses, and swine, draw wells, endless grainfields with flocks of grouse swooping down, roads flanked by long rows of nut trees or locust trees -- all this gives this strip of land a certain appearance which reminds one of the Hungarian prairie.

The steep escarpment of Parndorf Heath toward the lake area is covered with loess and is chiefly a wine region. On the slope and at the foot, near the lake, stands the town of Neusiedl (population 3,600) (Photo 74).

Toward the lake shore there are large truck gardens whose produce, such as lettuce, early potatoes, vegetables, onions, and marjoram, are shipped to Vienna.

Of the settlements along the steep escarpment to the SE, Goels has the largest vineyard area of all wine settlements in Austria. In 1935 more than 50,000 hectoliters were produced here; this is one-tenth of the total Burgenland production at that time.

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2. Central Burgenland. This area, covered in the interior with Tertiary deposits (gravel, sand, clay), is surrounded by the Oedenburg Mountains in the N, the spurs of the Buckliege Welt Hills -- the Landseer and Bernsteiner hills -- in the W, and the Guenser Mountains in the S. In the middle of this crystalline fringe rises Mt. Pauliberg (730 m) N of Landsee; it consists of basalt. Basalt deposits are also found near Oberpullendorf. Both deposits furnish road gravel.

The Rabnitz with its many tributaries and the Guens River cut the area, which dips toward E, into an interstream plateau which descends toward the flatlands in the form of steps and runs into the western Hungarian lowlands.

The western part of the area is heavily wooded -- one-third of Central Burgenland is woodland -- so that forestry predominates in contrast to the flat eastern part where we find mostly agriculture and animal husbandry. The Oberpullendorf Basin is particularly fertile (maize, sugar beets, tobacco). In certain protected spots viniculture and fruit cultivation are also lucrative (red wine, pit fruit).

In Deutschkreutz and Kobersdorf there are mineral springs. The clay deposits near Stoob and Raiding (birthplace of composer Franz Liszt) form the foundation of the handicrafts and factory production of clay vessels, oven tiles, and pitchers. Of the few industries in this part of the state we might mention the large sawmills in Lockenhaus and Lackenbach. In Lockenhaus there is a wood products plant (school furniture) and a textile plant (Loden and cloth production).

Central Burgenland is mostly a pure farming area. More than one-third of the soil is arranged in large holdings. The farms are

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medium, small, or very small operations. The settlements, most of which are small, often are lined up against the edges of the terrain steps. Centers of commerce and trade are the market community of Deutschkreutz (population 3,900) and Markt Oberpullendorf (population 1,400), the capital of the district, which together with Unterpullendorf, forms a Hungarian language island.

3. Southern Burgenland. This area is enclosed in the N by the spurs of the Bucklige Welt hills, the Bernsteiner Mountains, and the Guenser Mountains (Mt. Geschriebenstein, 883 m). A few limestone blocks (quarries) are superposed on their crystalline slate in the S. In the W we find veins of serpentine, volcanic rocks, and ore. Chalcopyrite and pyrite ores are no longer worth mining. The only deposit of asbestos near Markt Rechnitz (population 3,300) has not been exploited since 1945. N of this place, at an elevation of 730 m, a tuberculosis sanitarium has been erected. Antimony ore is being mined near Markt Stadtschlaining, precious serpentine near Bernstein; the latter is processed in 2 polishing plants into decorative articles (cups, vases, etc) which are exported abroad.

The Southern Burgenland looks very much like the eastern Styrian hill country; the brooks, tributaries of the Raab, cut the Tertiary deposits into interstream plateaus which dip from 400 to 200 m. The valleys in the mountains are narrow; further downstream they have wide floors and are swampy in places on account of the small gradient and the frequent floods. The settlements are therefore mostly situated on valley ledges or in the spring hollows of the brooks. In the area of Mt. Eisenberg (415 m) a block of crystalline rocks rises once again; this block is crossed by the Pinka River via a breakthrough valley. (Serpentine quarries near Woppendorf, porphyry quarries near Hannersdorf.)

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In Southern Burgenland, as in eastern Styria, volcanoes broke through the Tertiary deposits along depression lines or came to a halt in them. The best-known remnant is the castle hill of Guessing (basalt; Photo 75). The richest brown coal mine of Burgenland lies near Tauchen in the highest parts of the Tertiary deposits.

Southern Burgenland lies in a transition zone between Central European and Pannonian climate zones. The forests are compact on the N and W; in the E they are interspersed with large fields, orchards, and vineyards. Arable soil takes up almost half of the surface area. Meadows and pastures, particularly in the valleys, and fodder crops form the foundations of a lucrative animal husbandry; forestry, however, is also important. The rivers power small sawmills, grain mills, and small power plants.

There is little industry. Large land holdings decrease as we go S. Most of the farms are medium and small.

From Friedberg in Styria a railroad line runs to Steinamanger (Szombathely) in Hungary, along which we find the town of Pinkafeld on the Pinka River (population 3,500; mentioned in 860 as "Pinichan"; 3 textile plants, leather factory, brick oven, fruit processing company); on the middle course of the Pinka stands the administrative center, the town of Oberwart (population 4,500), the chief settlement of the "In der Wart" section.

The settlements of Oberwart, Unterwart, and Siget in the Wart section form a Hungarian language island. About half of the population of Oberwart are Hungarians who engage in agriculture, while the German-speaking inhabitants engage in commerce and the trades.

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Oberschuetzen (high school; fruit cultivation) is the terminal of a branch line and the loading point for coal from Tauchen. To the S of it lies Bad Tatzmannsdorf. The economic center of the area is Markt Grosspetersdorf (population 1,900; clothing factory, brick oven).

The chief settlement of the district, Markt Guessing (population 2,800; fish ponds), lies in the densely settled and fertile Strem Valley. The market community of Jennersdorf (population 1,800; brick oven) in the Raab Valley is the chief settlement of the state's southernmost district by the same name.

III. Economy

Burgenland's natural resources are not inconsiderable, though they are by far not as much exploited as those in other states; some are still awaiting exploitation.

Due to the soil structure of the state one cannot expect bituminous coal deposits, only brown coal deposits. The largest quantity is being mined at Tauchen (Table 5). Antimony ore is being exported for smelting. The asbestos deposits at Rechnitz are not being worked at this time. The precious serpentine deposits at Bernstein are the only ones in Austria. The chalk of Muellendorf -- pure, white calcite -- is processed in 2 plants. The many calcareous sandstone quarries along the edges of the Leitha Mountains and particularly the Rust Hill Range make excellent building stones for use in the adjoining federal states. The Tertiary plains and hills are believed to contain petroleum.

More than 20 mineral springs are known to exist in Burgenland; some are sulfur springs, others are acidulous springs.

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The bathing resorts of Tatzmannsdorf and Sauerbrunn used to be very popular. The water from the strong carbonated springs at Sauerbrunn, Deutschkreutz, and Sulz near Guessing is also exported beyond the borders of the state.

Burgenland is pure farm country; it produces a surplus of grain, fruit, vegetables, wine and animal husbandry products. By virtue of its location near Vienna and Graz and the industrial region of the Vienna Bay it contributes materially to the supply of these most important consumer centers of Austria.

Of all other federal states, Burgenland has the greatest percentage of farm, vineyard, and orchard areas and the least forested area (Table 4). Lake Neusiedler is responsible for the fact that the unproductive part of the state amounts to more than a tenth of the total surface area. Cereal grains hold first place, then potatoes, sugar beets, maize, and fodder plants. In the central and southern parts buckwheat often is the second crop. Northern Burgenland has the largest vineyard area; viniculture decreases in the central and southern parts.

The state is one of Austria's most important fruit-growing regions. In the northern, warm part we find more stone fruit and strawberries; in the rougher southern part there is more pit fruit [sic]. Farm cooperatives, equipped with modern storage facilities and fruit presses, process and market the fruit in this area.

The town of Neusiedl is a truck gardening center. The communities in the Seewinkel section produce rich crops of early vegetables.

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The cherrywood enterprises in Mattersburg District and tobacco cultivation in various sections of the state are of some importance too. The young shoots of cherrywood and products made from them, e.g., cigarette holders, are exported mostly to Egypt and India.

Cattle, horse, swine, and fowl breeding is important, particularly in the vast grass prairies of the Seewinkel area. In 1952 there were 44 head of cattle per 100 inhabitants (Austrian average: 34), although there are few meadows and pastures available especially in Central and Southern Burgenland.

Austria's share of the reed area of Lake Neusiedler amounts to 77 sq km; the reed could be used in a much better manner.

The forested area is far below the Austrian average. Large sections in the N of the state are bare.

Burgenland gets its electric power mostly from Styria and Lower Austria; it does not have a state power company of its own.

There is little industry in Burgenland. Only a few plants are important in Austria's overall industrial picture.

Of these, we have the sugar factory in Siegendorf, a few wood processing enterprises, reed processing in a few settlements on Lake Neusiedler, and chalk production in Muellendorf. Major textile establishments with special products are based in Neufeld, Neudoerfl, and Hornstein, i. e., on the western state border and in connection with the industrial region of the Vienna Bay.

Many small farmers in Central and Southern Burgenland engage in home handicrafts; they make all kinds of plaitwork articles, handles for shovels, brooms, pots, etc. For a long time a part of

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the male population of the state has been seeking employment in neighboring states in the building trades and in other professions. (The local poet of the "Heanzen" section, Josef Reichl (died 1924) once wrote that the Burgenland worker lives between "flight from the land and homesickness.")

The W-E railroad network of Burgenland, which consists mostly of branch lines, cannot fully cover the requirements of the long drawn-out Burgenland. Bus lines and trucks therefore handle most of the passenger and cargo traffic.

There are no continuous N-S rail connections in Burgenland. The rail line in Central Burgenland begins and ends in Hungary. After its incorporation into Austria, the road across the Oedenburg Mountains and the rail line Friedberg -- Pinkafeld were built in an effort to improve communications. A N-S through highway is under construction.

IV. Government and Population (Table 10)

Eisenstadt and Rust are cities with their own charters. The remaining area is divided into 7 rural districts of which 3 (Neusiedl, Eisenstadt, and Mattersburg) are in the northern part, one district (Oberpullendorf) in the center, and 3 (Oberwart, Guessing, Jennersdorf) in the southern part.

The 1951 census revealed the following language picture: 87% were German-speaking, 11% were Croatian-speaking, and 2% were Hungarian-speaking.

The largest number of Croats settled in the Eisenstadt District (more than 10,400); the largest number of Hungarians was to be found in Oberwart District (2,700), after which came Neusiedl District with 1,000 and Oberpullendorf with 1,000.

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The German settlement by Bavarians, Franks, and Swabians dates back to Carolingian times and originated in the Danube region, Styria, and the Pitten Marches; it extended beyond the eastern frontier. People from Salzburg and Swabia settled in the plain E of the lake even after the Turkish invasions had been beaten back.

The inhabitants, particularly those in Southern Burgenland, are often called "Heanzen." The origin of this word has not been clearly determined. "It may be assumed that Heanzen country means nothing but farm country." The dialect with its sectional variations is Middle Bavarian and is similar to the Lower Austrian Weinviertel dialect (Muida = Mutter [mother], Pflui = Pflug [plow, Kui = Kuh [cow], etc). South of the Lafnitz River the "ui" syllable is replaced with the South Bavarian "ua."

In the Middle Ages, when the frontiers were broad strips of land rather than firmly defined lines, Magyars were used as border guards in the Hungarian settlement zone where they still form language islands and preserved their customs. In Northern Burgenland they live mostly as farm workers on the dairies of the large land holdings or scattered in a few larger settlements.

The Turkish Wars (1529 Vienna, 1532 Guens, 1664 St. Gotthard on the Raab, 1683 Vienna) tore huge gaps in the population of the frontier. The flow of emigration was replaced mostly with Croats, chiefly refugees themselves or subjects of Hungarian lords from Croatia and Dalmatia, in the sixteenth and seventeenth centuries. They still speak the old-fashioned dialects of the regions whence they came. They have partly preserved their customs and dress.

Croats and Magyars get along well with the German-speaking majority and enjoy exemplary minority rights (schools, churches, etc).

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Despite the presence of the various nationalities, house and settlement types are uniform and correspond to those in the remaining neighboring areas of Austria.

There are several belts of fortifications; they characterize the frontier which is open toward the E. There are many ruins, castles and palaces, defense towers and fortified churches, and other remnants of fortifications. The beautiful and mighty fortifications in Forchtenstein, Kobersdorf, Lackenbach, Deutschkreutz, Landsee, Lockenhaus, Bernstein, Schlaining, Rechnitz, and Guessing are well known.

Burgenland, being farm country, is densely settled.

More than one-fourth of the total surface area is taken up by large holdings. Most of the farms are only about 5 hectares large. This explains the continuing demands for soil reform. (There are hardly any large holdings in the so-called "land-hungry" districts however. It is a fact, though, that the surplus-producing large establishments play a major role in the production of the area.) Between 1922 and 1934 more than 20,000 Burgenland citizens emigrated to the New World.

Burgenland was hard hit by the last war. Entire settlements and much property were wiped out, the cattle were decimated, and gaps were torn in the forest belts. More than 300 km of trenches and thousands of small fortifications dotted the land. The Southeast Wall was not filled up completely until 1949, creating 50 sq km of arable land.

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BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

Employed People	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
150,000	63%	25%	4%	2%	3%	2%	-	1%
Occupational Subdivision of the Population	47%	27%	5%	2%	3%	1%	10%	5%

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Compare and compile:

Proportion between arable soil, forests, meadows, and vineyards (Table 4). Mining: type and deposits (Table 5). Mineral springs. Railroads leading into the state from adjoining federal states. Percentage of population decrease 1934-1951.

The Federal State of Vienna

Area: 1,215 sq km; population 1,766,100 (1934: 278 sq km, population: 1,874,100); relative population density: 1,453 (Table 10).

I. Vienna's Location in Europe

Vienna owes its development mostly to its advantageous geographic location and partly to the fact that it was for centuries the capital, imperial residence, and government center of a large empire. The arc formed by the Alps and the Carpathians crosses Europe and separates peoples, climate, and botany. This arc has a gap in just one place. In this gap grew the world metropolis, covered and protected against the NE end of the Alpine arc, nestling against it. The breakup of the connection part between the Alps and the Carpathians created gaps which made possible the passage from the Alpine Foreland into the interior of the Hungarian lowlands. The most important gaps, the Vienna Gap and the Hungarian Gap, were used by the Danube, Central Europe's largest river, on its way from W to E, tracing a natural highway of communications.

This W-E link was crossed in the Vienna region by a N-S communications route. This route came from the Oder and Vistula, ran across the broad gap between the Sudeten Mountains and the Carpathians (310 m) into the March Valley, and from there turned along the outer fringe of the eastern foothills of the Alps toward the Hungarian Plain to the S; in this manner the Baltic Sea was connected with the Adriatic

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Sea ("Amber Highway"). During the Middle Ages the point of intersection of these transportation routes shifted from the eastern fringe to the western fringe of the Vienna Basin; in place of the Roman highway E of the Leitha and Rosalien mountains, the pack road via Mt. Semmering had been used since the thirteenth century.

As the Hapsburg dynasty increased its domains, Vienna's importance grew at the site where the East Alps region and the Sudeten and Carpathian regions open toward each other. At that time the gaps further to the NE, via the Bohemian and Moravian heights, which today contain the railroads, gained greater importance. Vienna, the largest commercial city along the Danube, finally became the residence of the German and later the Austrian emperors.

The improvement of the road net in the eighteenth century and the development of the railroad lines in the nineteenth century increasingly concentrated the spokes of the transportation hub in Vienna andaanchored it in the landscape with the help of the iron strands of the railroad lines. Vienna is the meeting place of highways and railroads coming from all directions: from the North Sea and the Baltic Sea, from the Black Sea, from the Adriatic Sea, and from the Atlantic Ocean. Vienna holds a key position in the Central European transportation network.

II. City Location, Metropolitan and Settlement Aspects

The former Pannonian Sea and a predecessor of the Danube clearly terraced the slopes of the Vienna Woods and the adjoining land; the brooks in the Vienna Woods cut the terrace terrain into interstream plateaus. Viennese soil extends from the western part of the March Plain, across the terraced land rising in a semicircle,

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and into the hills of the Vienna Woods. The overall picture presented by the city, whose sea of houses spreads chiefly along the right bank of the stream to the SW and S (Photo 76), is thus characterized by the Vienna Woods in the N, W, and SW, Mt. Wienerberg and Mt. Laaerberg in the S, the plains in the SE, E, and NE, and the Danube itself.

The present-day settlement aspect is the result of the merger of a number of old village settlements which in 2 concentric circles surrounded the city center, the so-called "Inner City" (First District). The Inner City, the "suburbs" in the area of today's Second to Ninth Districts, and the "commuter settlements" outside the present-day Guertelstrasse Boulevard gradually filled out the territory of Vienna. While residential and business sections developed in the former suburbs, factory and worker sections grew on the terraces N of the Wien River, in the S of the city, and in the plain beyond the Danube; there we can see today the huge new developments built by the City of Vienna. There are weekend houses and small gardens along the city periphery; fashionable homes can be found in the SW and NW. In the N and S, particularly on the southern slopes of Mt. Wienerberg, we find, adjacent to the industrial sections, new city periphery settlements with gardens and farm villages. The only remnants of the formerly very large floodplain belt along the Danube and its branches are the Prater section (recreation and amusement area, sports facilities, fairs) and the Lobau section.

Vienna's landmark is St. Stephans Cathedral with its 137 m high steeple, a monument of German Gothic style. All of Austria and friends abroad contributed to the restoration of this treasure after its destruction in 1945. A landmark of the industrial city might be

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the 160 m high gas tank of the Leopoldau gas plant in the N of the city. In the S, on Mt. Wienerberg, high above the new residential developments, rises the Favoritner water tower which reminds us of Vienna's huge water pipeline system.

The 2 mountain spring water pipelines from the Rax-Schneeberg and the Hochschwab areas, in combination with the emergency pump plants in the city, provide excellent drinking water which is distributed from 22 water tanks in the city via a pipeline network that is 2.305 km long. The springs annually produce about 240 million cu m of water. In 1951 more than 124 million cu m were piped to Vienna; of this quantity about 107 million cu m were consumed. The gradient of the pipeline is used on Viennese territory by 5 small power plants.

The Vienna Woods are a fresh air reservoir for the city and are important to the population as a recreation area. In order to protect the woods bordering on the city, a City Council decision in 1905 established a "forest and meadow belt" which today is 25 sq km large. There is a more than 20 km long highway leading from the Wien River Valley via the heights to Klosterneuburg; it makes the beautiful sections of the forests and the scenic observation points accessible to the public.

III. The Development of the Settled Area

On the basis of relics found to date, the settlement history of the Vienna region began in the Young Stone Age. All other prehistoric phases are likewise backed up by relics.

Fort Vindobona, a fortress on the Roman frontier highway, was built on a section of the city terrace which was protected against floods and which was dented by a curve described by one of the Danube's

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branches. This place is indicated by such local names as "Am Gestade," "Fischerstiege," "Salzgries," etc. The site of this Roman military settlement was determined by nature: in the NE a piece of the city terrace, in the NW the deep cut of Ottakringer Creek -- today the "Tiefer Graben" Avenue -- in the SE the cut of a water body which today is Rotenturm Avenue. Today it is assumed that settlement continued after the Roman occupation, though on a smaller scale. In 881 Vienna is referred to for the first time as Wenia. In the early Middle Ages the area of the Roman fort was gradually filled in. Roman ruins existed in the city as late as during the thirteenth century.

As important commerce center and later residence of the Babenberg dynasty (city charter in 1221), the settlement thrived rapidly under the influence of the heavy traffic during the crusades and was expanded repeatedly. By the middle of the thirteenth century the city had spread to the Ringstrasse Boulevard, covering the entire Innere Stadt section; the city walls were also pushed out. In the sixteenth century, as a result of the unification of Bohemia and Hungary with Austria and by virtue of the fact that it later became the residence of the Hapsburg dynasty, the city assumed an important central position. The approach of the Turkish armies turned the fortified city into an outright fortress.

In front of the fortress there was a field of fire, a broad, empty strip, the so-called "glacis," which separated the city from the "suburbs" which had grown out of the villages. New suburbs rose on the fields and vineyards between them.

On the advice of Prince Eugene, the suburbs were surrounded from 1704-1708 with fortifications, the so-called "line wall," as protection against the Kuruzzians.

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In 1858 the now superfluous interior fortifications were razed. This area and the glacis were then gradually built up; in its midst we find today the Ringstrasse Boulevard, along which there are many magnificent public and private buildings, such as the Votiv Church, the University, the New City Hall, the Burg Theater, the Parliament building, the Justice Department building, several museums, the Opera, etc (Photo 77). After the fortifications had been razed, it became possible to combine the city center with the 34 former suburbs; this area had been divided into 8 administrative districts since 1850; in 1869 there were 9 such districts. In 1874 parts of the Fourth District which were outside the line wall were set up as the Tenth District.

In 1890 the line wall was razed and replaced with today's Guertelstrasse Boulevard. At the same time the suburbs were incorporated into Vienna and organized into districts Nos XI to XIX. Thus the vineyard villages of Grinzing, Sievering, Heiligenstadt, and Nussdorf were incorporated into the "Greater Vienna" of that day. These villages had for centuries been the centers of extensive viniculture which as early as during the Middle Ages made Vienna one of Europe's first wine producing centers. In 1900 a part of the Second District was set up as the Twentieth District. A few communities N of the river were incorporated into the city in 1904 as the Twenty-first District in view of the planned construction of the Danube-Oder Canal and its port facilities. In this manner a new industrial section was made part of the city. In 1910 the rest of Strebersdorf was added to the Twenty-first District, giving Vienna a total area of 278 sq km.

The Constitution of 29 December 1921 made Vienna a federal state. From 1934 to 1938 Vienna was not a federal state; it became

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the "Federal Capital." Vienna lost this position in 1938 when Austria was incorporated into Germany. As a result of an over-ambitious "large-scale area planning" project, large sections of Lower Austria were added to Vienna, increasing its area 4-fold (1,215 sq km; circumference: 226 km). Vienna absorbed large parts of the Vienna Woods and vast, pure farming areas which would have been needed only if the population had increased phenomenally. In 1946 the Constitution decreed that the area was to be reduced to 392.66 sq km but this change has not been executed so far.

IV. The Danube at Vienna

The Danube, whose course within the city limits was 23.8 km prior to 1938, while today it is 42.3 km, was Vienna's main E-W transportation route. After passing the narrows between the Vienna Woods and Mt. Bisamberg, it pushes many branches into the plain. The repeated floods were a constant threat to the settlements on the southern branch of the river and in the areas between the branches.

The first bridge across the river and its branches was built in 1439. A basic river control project was not carried out until the years 1869-1875 in the Vienna area; as far as can be expected, these river control facilities today protect the city against floods. The branches were channeled into a single stream and a new bed ("Great Danube") and 5 bridges were built across it. The Danube Canal -- the name of the southern branch since 1686 -- was expanded and protected against floods. The remnants of old branches now form the "Old Danube" on the N side; it is today a very popular water sports and bathing area (Photo 71). On the right bank the vast, about 8 sq km large natural park in the Prater section was protected against floods. A winter port was built at the mouth of the Danube

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Canal and port facilities with warehouses were built on the right bank. From 1931 to 1937 an average of more than 900,000 t of goods were loaded and almost 300,000 t unloaded per year.

New port basins and warehouses were built below the mouth of the Danube Canal between 1938 and 1945. A part of the planned Danube-Oder Canal was pushed through the Lobau section and into the March Plain. Pipelines bring petroleum from the oilfields to the NE to a refinery in the Lobau section. Plans have been made for a new Danube port in this area and for a new industrial section to the S of it.

V. Climate and Flora

The gap region makes the Vienna area a transition zone between the Central European climatic province in the NW, with its cool summers, mild winters, and higher precipitation, and the more continental climate province in the E, with its hot summers, cold winters, and low precipitation.

The climate of Mt. Kahlenberg corresponds approximately to that of Munich, that of Grossenzersdorf to that of Budapest. The predominant cool and damp winds come from the W and NW. The dry SE winds increase the summer heat and the winter cold. The precipitation decreases considerably from the heights of the Vienna Woods to the eastern edge of the city (Figure 12). The summertime temperature rise is quite noticeable.

The annual duration of sunshine averages 1,838 hours (Daves tuberculosis sanitarium in Switzerland: 1,814 hours). In June and July one can expect an average of 8 hours, while Mt. Sonnblick, e.g., can be expected to have only 4 hours of sunshine.

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	Temperature in °C (1921-1950) Jan	Jul	Annual	Annual Precipitation (1891-1930)
Mt. Kahlenberg, 483 m	-2.7	18.8	8.4	747 mm
Mt. Hohe Warte, 203 m	-1.1	19.9	9.6	683 mm
Grossenzersdorf, 153 m	-1.6	20.8	9.9	553 mm

In keeping with the climate, the flora also represents a transition zone from the Baltic flora in the W to the Pannonian flora in the E.

The eastern fringe of the Vienna Woods is the meeting place of the characteristic trees of both plant formations -- the beech forests of the W and the oak and black pine forests of the E and SE. The oak forest forms the best foundation for grain cultivation; for this reason these forests were cleared by man to the greatest extent of all forests. Vast grainfields replaced the oak brush forests and the prairie in the plains. The increasing building activity squeezed out the old vineyard sections in the city limits and pushed them to the sunny slopes of the northeastern Vienna Woods (Klosterneuburg, Nussdorf, Grinzing, Sievering).

VI. Economy

Agriculture and Forestry. As we can see in Table 4, the city expansion of 1938 caused great changes in the percentages of the various usefully exploited areas. Only a little less than one-fourth is covered with buildings, streets, squares, and water bodies, etc; almost two-fifths are covered with arable soil and more than one-fifth with forests.

In 1951 the agricultural and forest areas were exploited by about 8,700 enterprises (34,000 employees) of which, to be sure, more than 5,200 were small operations between 0.5 and 2 ha. Almost

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half the area consisted of almost 77 large holdings of over 100 ha (Vienna Woods forests, large-scale establishments, mostly owned by the City of Vienna). Vienna's wheat crop is twice as large and its rye crop is as large as those of Salzburg and Tirol together. Animal husbandry is quite considerable. A large portion of the city's food supply is accounted for by the dairies -- the 21 city districts alone have about 120 dairy establishments -- the large vegetable truck farms, the large potato crop and the considerable quantities of high-quality wine (1950: 45,000 hectoliters). In 1951 agriculture and forestry employed 23,000 people.

Trades, Commerce, and Industry. Vienna is Austria's number one trades, commerce, and industrial city. The contribution of the world metropolis to the total Austria production is by far greater than one might expect in view of the number of inhabitants. Vienna is the production center for handicrafts and industrial finished products which require special technical or artistic work. Viennese fashions and taste are carried to the far corners of the world by the city's expensive leather goods, knitware, clothing, arts and crafts, glass, porcelain, and ceramics, gold, silver, and artistic forged articles, and jewelry and custom jewelry.

Vienna holds a major position in the production of consumer goods. Almost half of Austria's total production of iron and steel is processed in Vienna. More than two-thirds of all enterprises of the machine industry are concentrated in the city. Almost the entire radio industry of Austria is located there. The industrial picture is rounded out by the enterprises of the food processing, shoe, textile, paper, wood, clothing, and furniture industry.

The importance of the various economic branches can be seen from the number of employees when compared to that of Austria taken

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together. Vienna accounts for 59% of Austria's graphic industry employees, 55% of the financial, banking, and insurance fields, 46% of the business field, 40% of the leather and clothing industry, 37% in the hotel and restaurant field, 37% of the chemical industry, 36% of the transportation field, 30% of the iron and metal industry. In 1950 the number of employed individuals was about half a million, of whom 70% were blue collar workers and the rest white collar workers.

VII. Government and Population

Vienna is the seat of the National Council, the federal president, the federal government, and all central government agencies of the nation and the State of Lower Austria; it is also an archbishopric.

Vienna contains 25.5% of Austria's population. Despite the expansion of the city area, the population of Vienna has been decreasing steadily since 1910. At that time the area of the 26 districts had 2.2 million inhabitants.

Compared to 1934, the population figure of 1951 is about 15.9% lower. The causes of this constant shrinkage can be found in the losses during the 2 world wars, the emigration, the small immigration, and the fact that deaths exceed births.

In 1951 there were almost 95,000 houses. The city of Vienna is trying to alleviate the great apartment shortage through the construction of public developments and "city periphery settlements."

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BREAKDOWN OF THE POPULATION BY OCCUPATIONS (1951)

	Employed people	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Un-employed	Un-known
	836,700	3%	53%	22%	11%	7%	2%	-	2%
Occupational Subdivision of the Population		2%	41%	18%	8%	6%	1%	20%	4%

VIII. Vienna's Cultural Significance

Many generations of Vienna's population have contributed their share to the growth of the city's culture. The city has always been a bridge between E and W. Romanesque churches and Gothic cathedrals, baroque palaces, places of worship, and monuments, Old Viennese Biedermeier-style houses, The Ringstrasse Boulevard buildings of the "foundation period," and the blocks of municipal apartment developments shape the external picture of the city. It has a rich heritage of the most varied, often unique collections. Vienna can boast of a large number of creative personalities and works of genius in almost all fields of cultural life. A multitude of names and works in the fields of music, the theater, science, and above all medicine and the plastic arts is forever connected with this metropolis. Vienna is an educational center of the first order. Even today many foreigners study at its 8 universities and colleges (Vienna University, Technical College, Agricultural University, World Commerce College, Veterinary College, Academy of Plastic Arts, Academy of Music, Academy of Graphic Arts, Academy of Applied Arts). The city also can point to great numerical and performance achievements in sports (figure skating, soccer).

Vienna's cultural achievements are an important contribution to international understanding.

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SECTION III. ECONOMY

1. Agriculture

The manner of soil utilization and the type of product are determined by the soil type, soil configuration, climate, and elevation.

A knowledge of soil types is very important. It depends on the climate, the soil structure (matrix) and the degree of development of the topsoil (state of ripeness). The latter is influenced by plant life on the soil and the life of the microorganisms and animals in and on the soil (soil biology); in addition we have chemical-physical processes in the soil, such as weathering, solution, transformation, fixation and shifting of substances (soil dynamics).

In the Alpine Foreland and in the flysch zone -- except for the alluvial and gravel strips along the rivers -- and partly in northern Burgenland, a deep-seated, sandy-loamy brown-earth forest soil predominate; this soil is frequently replaced in the remainder of Burgenland and in the Styrian hills with a deep-seated, moderately acidic, sandy-loamy podsol forest soil. Both soil types are fertile and are intensively cultivated. Steppe chernozem can be found, partly superposed by loess, in the Weinviertel area and along a strip S of the Danube in the Vienna Bay. This soil type is the best farming soil and is ideal for grain cultivation. The shallow, grey, sandy, lime-free, and little fertile podsol is accompanied by small moors in the Bohemian Massif and occurs particularly in the Gurktaler Alps and in the eastern spurs of the Central Alps. In between the calcareous Paleozoic rocks of the Graz hills form an island of calcareous soil. Podsol also predominates in the northern

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and southern graywacke zone. Mountain soil on limestone and dolomite, called lime humus soil ("rendzina"), occurs at high elevations in the form of rubble or karst, at lower elevations mostly as black Alpine humus and is good for forests, pastures, and meadows. This lime humus soil accompanies the Central Alps on both sides in a broad strip; in these parts we find silicate-rock mountain soil in which we can detect all transition forms from subsoil to coarse soil (residual soil) of the bare rock wastes. A special feature in the Seewinkel area is the soda-containing alkaline soil whose salt comes to the surface in small hollows. This soil brings about a unique, salt requiring vegetation. The soil types of the agriculturally utilized areas are affected by the working methods and fertilization.

The new atlases contain soil type maps of Austria. The whole picture becomes clear when we compare the maps illustrating the geological structure, the climate, the soil types, and the plant cover. The topsoil of the arable areas embodies above all the work of the farmer, while the subsoil represents the natural riches of the soil. These must be recognized, utilized, and preserved.

Grain cultivation includes Austria's entire range of grain types which correspond to the geographic latitude and climate. In all crop types the Austrian hill country reveals the largest cultivated area. On an overall average, rye is first, then wheat, oats, and barley. The distribution of areas cultivated with the several grain types varies, depending on the prices obtainable and on the land where this is made possible by the climate.

In the mountains, particularly on the higher valley ledges, we find grassland, fields, and pastures. There is crop rotation between field cultivation and meadows. Crop rotation is the predominant

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cultivation system in most of Austria. In this manner the nourishing substances are better utilized as a result of a certain sequence of plants cultivated on the same piece of land (crop sequence). In 1951, 17% of all agricultural and forestry establishments were purely tilled areas [sic] (8,840 sq km).

Maize cultivation requires good soil and warm, not too dry summer weather.

It also penetrates into the climatically favored Alpine valleys (foehn effect). In addition it is planted at green fodder maize (silo maize). Maize is grown in the upper Drau Valley and on the lowest steps of the Isel and Moell valleys, in the Klagenfurt Basin, in the Mur Valley S of Graz, in the Alpine Foreland E of the Enns, in the Weinviertel area and in northern Burgenland. The maize region also includes the entire Inn Valley with the Wipp Valley, as well as the Rhine Valley with the Ill Valley.

Potato cultivation is widespread. It requires sandy, not too heavy soil.

Tirol, Salzburg, and Vorarlberg have percentagewise the smallest cultivated areas and their crops are correspondingly small.

The sugar beet grows on deep-seated soil with a warm summer climate.

For this reason Lower and Upper Austria and Burgenland are the chief beet growing regions. Recently eastern Styria has been added to this group. The total cultivated area is increasing gradually until the crop can cover the area's needs.

The cultivation of legumes and fiber plants (flax, hemp) is confined to small areas.

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Flax is being grown in parts of the Muehlviertel and Waldviertel areas and in eastern Styria. To improve the domestic supply of hemp, the cultivation of this plant has been launched in Upper Austria.

Hops cultivation, which was discontinued in 1939, was resumed in the Muehlviertel and Innviertel areas, in the Salzkammergut area, in the Wachau section, and around Stockerau.

Tobacco field cultivation is increasing in Austria. In 1951 the area amounted to 400 ha (Burgenland, Lower Austria, Styria, Upper Austria) which produced almost 700 t of raw tobacco.

Vegetable cultivation requires good soil and adequate irrigation. It also requires the possibility of rapid marketing and can take place in the form of truck gardening only around the periphery or in the vicinity of major cities. The city markets also are aided by small gardens and weekend gardens to a by no means inconsiderable extent. Nevertheless some types of vegetables must be imported or bartered from abroad.

Viniculture depends on a warm and dry summer climate and is therefore found only in the SE and NE of the Alpine fringe area and in the Carpathian Foreland.

The cultivated area varies from year to year. From 1923 to 1950 it varied between 26,000 ha (1933) and 37,000 ha (1939). In 1952 it was about 35,900 ha (productive area: 31,200 ha); of this area three-fifths were in Lower Austria, more than one-fifth in Burgenland, less than one-tenth in Styria; Vienna with its 26 districts accounts for 4.6%. The vine is very sensitive to the weather and pests; for this reason the production volume and quality vary from year to year.

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In 1950, volumewise the third best year since 1923, about 1.3 million hectoliters of new wine (must) were produced; in 1952 there were only about 746,000 hectoliters.

Fruit for home consumption is grown chiefly in the small, individually-owned orchards; for commercial purposes there are large orchards in areas with the proper climate.

Although we can detect a certain time rhythm in the fruit crop, the weather and pest control also play a role in this. The most frequently grown fruit is the apple; the main grower is the farmer of the east Styrian hills (edible apples). The variety of its assortment, the expanded storage facilities, and the expert care gain for the Styrian apple crop a foreign market in productive years. About two-fifths of the total pit fruit crop consist of pears. In a large part of the western Alpine Foreland cider fruit is harvested; from the eastern, warmer part we get edible fruit. Then we have the stone fruit crops (edible plums, greengages, apricots, and cherries). Northern Burgenland delivers chiefly cherries to the Vienna market. Depending on the need or the trade treaties, larger or smaller quantities of edible grapes (in 1952, more than 22 million schillings worth, e. g., from Bulgaria, Italy, Yugoslavia), walnuts, peaches, apricots, pears, apples, plums (from Yugoslavia, Italy, and Hungary) and hazel nuts (1952, more than 29 million schillings worth from the Mediterranean countries) are imported from abroad. More than 143 million schillings were paid out abroad for tropical fruit (citrus fruit, raisins, figs, almonds, dates, and bananas). ~~Here too the market~~ requirements, regulated by trade treaties or advanced by the trade partner, play a role.

With respect to animal husbandry, it can be said that the

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domestic animal situation of a country forms a very important part of its national wealth. Of all the branches of animal husbandry, cattle, horse, and swine breeding hold the top positions. The foundation of the entire agricultural animal husbandry is formed by cattle breeding because of its importance and general occurrence.

It is important not only for the food supply but also forms the basis of the very existence of a majority of Austria's farm population. Cattle breeding is concentrated in the Alpine areas where the vast valley and mountain pastures create the most favorable conditions for the breeding and raising of cattle, though green fodder cultivation and the use of energy fodder (shredded sugar beets, linseed cake, etc) in the flatlands also make possible large-scale animal husbandry. The overall husbandry goal is a combined, satisfactory average result with respect to milk and beef production and work utilization. In some areas we find special breeds of cattle which can be raised better in other areas and which are exported not only to Austria's extra-Alpine sections but also abroad (1952: about 3,000 head).

Growing out of the cattle breeding and raising effort, we find the dairy economy which quantity and quality-wise is one of the most important production branches of Austrian agriculture.

In 1937 a total of 2.4 million t of milk were produced; of this figure, about 1.4 million t were marketed. After the difficulties of the postwar period had been overcome, the 1952 market figures approached those of 1937.

The importance of animal husbandry is indicated by the still existing customs connected with the springtime cattle drive to the

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mountain pastures and the autumn drive back to the valley. In the high mountain regions, the lower situated pastures, called "Maiensassen," are occupied if the higher situated "Hochleger" pastures are still covered with snow in the spring or if they have been thoroughly grazed off by the fall. The mountain pastures are divided into "cow pastures," "Galt pastures" (for nonbreedable cattle), and "sheep pastures." Certain parts of the mountain pastures are reserved for hay growing ("pasture commons"). Even the grass of the almost inaccessible "mountain meadows" is cut -- frequently with the help of crampons for abetter foothold -- and stored in high situated barns as "wild hay"; in the winter it is transported to the valley on sleds or, recently, via simple cargo cable cars (Photo 9).

The great demand for good work horses since 1938 has caused a great increase in the number of horses; it is expected that the situation will return to normal within the coming years. Attempts are being made to resume exports. Horse breeding is concentrated mostly in Salzburg and Carinthia.

All measures required to promote horse breeding are under the decisive control of the government (supply of excessive number of breeding stallions being raised in the government horse breeding establishments, etc). Of the young horses, 80% belong to the coldbloods (heavy, bony, calm farm and draft horses, "Noric" breed), about 10% belong to the lighter and more mobile warmbloods, and about 7% consist of the small and tough "Haflinger" breed.

Swine breeding is aimed primarily at meat and fat production. By the end of 1952 the swine breeding establishments were able to make up their large wartime losses almost entirely. They depend however on fodder imports.

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In this manner swine breeding depends on world market prices. On the whole, fat production looks rather unprofitable. For one ha of fodder area, a swine will produce about 100 kg of fat; the cultivation of rape results in 600 kg of fat per ha.

Sheepherding does not have a major economic significance since mutton has neither become a popular food item in Austria, nor can sheep wool be considered a major contribution to the textile industry.

Fowl breeding is widespread, partly as component of the farm economy, partly as product of chicken farms.

At the end of 1952 the pre-1938 number of chickens had not been attained. Austria's egg requirement lies between 800 and 900 million pieces. In 1950 between 600 and 700 million eggs were produced and marketed in Austria. The egg-laying performance could be improved greatly if the farmers would only manage their chickens more economically (breed selection and selection of chickens). The lower Danube states and Poland help fill the egg requirement (import value in 1952 over 59 million schillings); they also ship slaughtered fowl. The one-time exports of Styrian fattened fowl has been discontinued due to the fodder shortage.

Agricultural structure. The agircultural and forestry areas under exploitation in Austria in 1951 amounted to 71,600 sq km, i.e., about 87% of the total economic area (1937: 89%, 1946: 84%). (The remainder is accounted for by lakes, ponds, running waters, uncultivated moors, communications routes, wasteland, or otherwise unusable land. The sum of the areas determined in the annual land utilization survey for certain reasons does not tally with the total surface area

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of Austria. See also the note in Table 4.) The arable soil in 1951 amounted to 16,600 sq km, or 20% (1937: 23%, 1946: 19%) (see Table 4).

The reasons for the slow expansion of agriculture are to be found in the marketing conditions (price differences) during the postwar years and in the lack of manpower. During the war large cultivable areas were taken up with road construction and fortifications, airfields, and troop training areas (e. g., "Doellersheim," Lower Austria, 191 sq km) as well as with new, vast industrial installations (including power plants). Besides, about 1,080 sq km of soil cannot be worked in Austria. The performance lag due to emigrating farm workers is to be made up for with the help of animal and motor traction power and with the use of more economically operating machinery. (According to a report of the minister of agriculture, 20,000-30,000 farm workers leave the land annually ("flight from the rural areas"). This phenomenon however is not confined to Austria.

More farm machinery is being produced in Austria and more is being imported. Its utilization can become efficient only if the plots of land are correspondingly large and regularly shaped as well as close together. This state of affairs has been aimed at for the past decades through the farm plot consolidations whose advantages have so far been recognized by only 400 communities.

Better and partly new cultivable land can be won from former wasteland (swamps, moors) through soil improvement ("melioration": drainage and irrigation, removal of stones, clearing of floodplain meadows, construction of high water dams, etc) (1946-1950: 200 sq km). This food growing area reservoir ("Tenth Federal State") is estimated at about 6,500 sq km and would require large-scale and

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expensive melioration projects; in this connection it was also calculated that the production increases would not always match the high costs (swampy valley floors, as in the Klagenfurt Basin, Enns Valley, Upper Pinzgau Valley, etc; irrigation requiring areas, as the Steinfeld Plain (Lower Austria), Parndorf Heath (Burgenland), March Plain, etc).

The 1935-36 crop year the food requirements were met in the most important domestic agricultural products; we can observe the following figures (in %): milk 100 (imports 0), dairy products 100 (0), sugar 100 (0), potatoes 98 (2), vegetables 93 (7), fruit 89 (11), eggs 88 (12), meat 82 (18), bread grains 76 (24), fish 25 (75). There was a sharp drop in production after 1945. This loss was made up gradually so that at the end of 1952 prewar conditions had in general been restored. The food consumption of the city population changed in comparison to the prewar days; for instance, less meat is being consumed while vegetable and fruit consumption has gone up. One must also consider the population increase of 150,000.

It is necessary to increase the domestic production of agricultural products.

To this end various efforts are being made, such as the preparation of good plans, increased imports of artificial fertilizer (phosphate and potash fertilizer) and fodder products, increase in per-ha production, acquisition of farm machinery and tools, corresponding seed supply and brand selection, increased planting of oleaginous plants, increased vegetable cultivation through use of nutrient salt solutions ("hydroponics"), special promotion of cattle and swine breeding, construction of goods transportation routes and cable cars for the mountain farmers, stepped-up farm training, reduction in price differences, etc. The world economic situation however is a serious obstacle; this situation has so far not been stabilized.

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DISTRIBUTION OF AGRICULTURAL AND FORESTRY ESTABLISHMENTS (1951)*

		Size	Percentage Distribution of the 432,848 farms	Percentage Distribution of the farmed area, 77,262 sq km
Generally Family-operated	Very small farms	of 0.5 ha to under 2 ha	24.3, thereof 37% in northern flatlands and hills	1.6, thereof 34% in northern flatlands and hills
Generally Family-operated	small farms	of 2 ha to under 5 ha	23.7, thereof 22% in northern flatlands and hills	4.4, thereof 22% in northern flatlands and hills
Generally Family-operated	medium farms	of 5 ha to under 20 ha	36.6, thereof 21% in SE flatlands and hills	21.8, thereof 19% in SE flatlands and hills
Generally Family-operated	large farms	of 20 ha to under 100 ha	13.9, thereof 19% in Alpine Foreland	26.6, thereof 20% on E fringe of Alps
	major farm enterprises	of 100 ha and over	1.5, thereof 50% in High Alps region	45.6, thereof 57% in High Alps region

*Not including areas requisitioned by the occupation powers. The farm census covered about 95% of the economically utilized area.

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2. Forestry

In 1951 forests covered about 37% (29,866 sq km) of the total area of Austria, i. e., 42% of the total agricultural and forestry area under cultivation. As far as forests are concerned, Austria holds fourth place in Europe. The most heavily wooded federal states are Styria and Carinthia.

The forests depend on the soil structure, the locations, and the climate of the particular area; however, down through the centuries man played an ever greater role through his "forest cultivation" effort. Alpine and uplands forests predominate; the last forest census in 1935 showed that 84% of the forests were coniferous, 10% red beech, 2% oak, and the rest deciduous. The chief tree type of the forests is the flat-rooted, fats growing, wind-vulnerable spruce (58% of the forest area); the red beech forests however are the most valuable. In 1951 there were about 12,100 pure forestry establishments, i. e., 3% of all agricultural and forestry establishments with an area of 20,740 sq km. An additional 6% also had meadow land and tilled soil. Private forest ownership predominates. In 1935, 44% were small holdings (less than 100 ha), 26% were privately owned medium and large forest holdings. Public ownership (federal government, state government, communities) accounted for 30% of the forest area, including about 4,000 sq km or 15% held by the federal government. These are mostly out-of-the-way mountain forests with little tree growth and high cutting costs.

The forest is not only an important source of national income; it is also in the interest of the public to preserve the forest (protection against soil erosion and avalanches; water reservoirs, etc) because of its general beneficial effects, particularly in the high

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mountain regions. Federal and state laws take care of this situation. The implementation of the laws and regulations is in the hands of the government foresters attached to the state and district authorities (state and district forest inspectorates), which for instance also instruct and advise forest owners, look after the controlling of wild-running creeks, and supervise the felling of trees. Certain management plans have been made for the forests under public ownership and the large and medium private holdings; these plans include the volume of tree cutting, reforestation, surveys on annual increases, wood supply, etc). These plans have been carefully coordinated. The forestry laws also define those forest areas which due to difficult conditions (landslides, falling rocks, avalanches, etc) must be handled with special care (protected forests, restricted forests).

The transportation of timber from the mountain forests often requires large-scale technical measures, e.g., logging roads, hoists, cable cars, and railroads, logging canals and logging ponds. All this tends to raise prices.

The annual timber growth is estimated at 7 to 9.5 million fm. In peacetime an average of 8.7 million fm were annually cut (35 to 38% firewood, 62 to 65% industrial lumber). Ever since World War I, and especially during World War II, the timber cutting figure in Austria exceeded the new growth figure. (From 1949 to 1952 roughly 18,000 ha were reforested; this by far does not remove the danger of karstification of some areas.) This situation would seem to require a reduction in the cutting volume. But lumber and wood products happen to be important items in Austria's exports. Lumber and wood products exports on an average accounted for 28 to 30% of Austria's total export value. Plans have been made to stabilize the cutting volume at 7-7.5 million

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fm, to reduce the firewood percentage, and to increase the industrial lumber percentage to 75%, and to export more wood in "processed" form. In this manner lumber and wood products exports are to be increased to one-third of the total export volume.

Resin production is a by-product of forestry. It takes place in the black pine forests of Lower Austria and in the larch regions of the Central Alps in the states of Carinthia, Styria, Salzburg, and Tirol and most recently also in the white pine regions of Burgenland. About 300 sq km of the black pine forests of the Thermal Alps in Lower Austria, which extend from Moedling via Neunkirchen to Gutenstein and Hainfeld, are being exploited. The resin obtained is processed in Piesting, Pottenstein, and Wiener-Neustadt (colophony, turpentine, etc). (The 1952-1953 raw resin production amounted to about 4,000 t, which in turn resulted in more than 2,800 t of colophony and about 700 t of turpentine. Austria consumes about 4,800 t of colophony annually.) Larch resin ("larch balsam") is particularly good for the production of special lacquers.

Forestry employs about 16,000 forestry workers and 6,000 forestry officials. To this we can add tens of thousands of employees of the wood processing industries and trades, so that about 18% of the Austrian population make a living from the cutting and processing of wood. In addition to its purely economic value, the forest gives man many other things which make it necessary to protect Austria's forest regions.

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3. Mining (Table 5)

As far back as during prehistoric times copper was mined in Salzburg and Tirol, salt in Hallstatt and Hallein, and iron near Huettenberg in Carinthia. The Romans highly valued the iron obtained in "Noricum" because of its quality. At that time gold was also being searched for in the Hohe Tauern Mountains. In the Middle Ages gold, silver, copper, lead, and iron ore mining brought about bustling activity in many regions of the Alps (mining of gold ore, e.g., in the Lavant Valley, Obervellach in Carinthia, Zell am Ziller in Tirol; silver ore near Schwaz in Tirol, Schladming in Styria; lead ore in Carinthia; copper ore in Tirol, Carinthia, and Radmer in Styria). Iron from Mt. Erzberg was shipped to all parts of Europe, even to India and the West Indies. In the course of the development of the world economy during recent times, mining operations were extended to coal (see note), graphite, oil slate, magnesite, talcum, iron and potash schist, kaolin, kieselgur, quartzite, baryte, antimony; in most recent time we have added petroleum and natural gas which are of great significance. ([Note] The earliest coal discoveries in Austria are those near Leoben (Seegraben) at 1606, Fohnsdorf 1670, Voitsberg 1716, Wolfsegg 1760.)

Austria's natural resources are most varied. Today however only the following are of special economic significance: brown coal, petroleum, iron, zinc, lead, and copper ores, magnesite, graphite, and salt. The deposits of many useful minerals are of 10 small; their exploitation -- except in emergencies -- and their profitability depend on world market prices. One can be sure that Austria has many other natural resources which government agencies are intensively searching for.

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At the end of 1951 the mining industry employed about 31,000 workers and employees, not counting the number of employees of the Lower Austrian oil fields.

Bituminous coal is being mined almost exclusively in Lower Austria. The largest deposit is located at Gruenbach on Mt. Schneeberg.

Total volume mined in 1952: 190,000 t; 1937: 230,000 t; 1946: 108,000 t.

The small enterprises which mined the bituminous coal of the Lunz layers in Lower Austria are practically out of existence. One can expect however that the less disturbed deposits will be tackled again at the proper time.

There are 2 small anthracite trial pits -- one on Turracher Heights and one on Noesslacher Joch (W of Gries am Brenner); the latter of these was given up in 1953.

Brown coal mining is by far more important; the deposits consist partly of high quality glance coal and partly of lignitic brown coal.

The glance coal, like the lignite coal, dates back to the Tertiary, but it was improved by the pressure of the mountains. Its heating value comes close to that of bituminous coal. The glance coal deposits are mostly heavily disturbed tectonically; this coal can only be mined in deep mines. The lignitic brown coal dates back to the Middle and Younger Tertiary; it occurs mostly in flat hollows and can be strip-mined in view of the relatively small superposition of other material.

The following are the most important brown coal regions:

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Upper Styrian glance coal region: Fohnsdorf, Seegraben near Leoben;

Southwest Styrian glance coal region: Poelfing -- Brunn -- Bergla, Wies -- Eibiswald region;

West Styrian lignite region: Koeflach -- Voitsberg -- Piberstein;

Lavant Valley brown coal region: St. Stefan -- Wolkersdorf-Wiesenau;

Wolfsegg-Traunthaler brown coal region: Thomasroith -- Ampfelwang;

Salzach Valley brown coal region: Ostermiething -- Trimmelkam in Upper Austria;

Middle Burgenland brown coal region: Tauchen.

Small deposits are also located in northern and eastern Styria (Ratten, Parschlug, Goeriach; Ilz, Kleegraben), in northern Burgenland (Rietzing, Poettsching), in Lower Austria (Langau near Retz, Neufeld on the Leitha), in Tirol (Haering), etc.

The total tonnage mined in 1952 was 5.3 million t; 1937: 3.4 million t; 1946: 2.4 million t. In 1952 the Styrian mines alone produced over 3.2 million t, or roughly three-fifths of the total tonnage mined; the Hausruck region produced 0.9 million t. Coal mining in 1952 employed about 17,000 blue and white collar workers.

AUSTRIA'S TOTAL SUPPLY OF SOLID MINERAL COMBUSTIBLES
1952: 9.8 million t

Bituminous coal = 20%	Brown coal - 61%	Coke = 19%	
Foreign 88%, domestic 12% Germany (Ruhr), Poland, Czechoslovakia, US, France	Foreign 17%, domestic 83% Czechoslovakia, Yugoslavia	Foreign 3%, Germany, Czechoslovakia	domestic 97% from foreign bituminous coal

The following shared in the consumption of these combustibles:

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industry 55.9%, homes 16.9%, Federal Railroads 13.2%, other transportation (e.g., shipping) 0.7%, power plants 6.4%, gas and water works 5.7%, Allied Powers 1.2%.

In 1952 domestic coal production was 55% higher than in 1937, so that -- with the help of the increased power production -- certain savings could be effected in connection with imports from abroad which had been increasing since 1946 (1951 = 167% of the imports of 1937 = 2.4 billion schillings, 1952 = 2.2 billion schillings). It is hoped that domestic coal production can be increased to 6 million t in the coming years. Well-known and productive coal deposits have been properly expanded since 1948, e.g., the "Salzach" installations in Trimmelkam (Upper Austria) and the deposits in the surroundings of St. Stefan in the Lavant Valley; new coal deposits have been explored systematically, e.g., those at Langau in Lower Austria. Drillings, such as those in the southern Vienna Bay near Sollenau, revealed undisturbed veins at 70-100 m depth with an estimate coal reserve of 50 million t. These veins however are difficult to mine on account of the alluvial sand.

In the interest of a more rational utilization of low quality brown coal, new thermal power plants are to be built near some mines, e.g., those built at Koeflach, Voitsberg, Fohnsdorf, and Timelkam. The St. Andrae power plant was commissioned in 1952.

Petroleum and natural gas are being extracted (in a geological sense) in the northern Vienna Basin.

Since the discovery of the petroleum region at Gbely, SE of Breclav (Lundenburg, Czechoslovakia) in 1913, drillings were made in geologically similar areas (Miocene) in Austria; these were successful

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for the first time in 1930, N of the town of Zistersdorf and in the southern Vienna Basin where they revealed natural gas. The trial drillings at Oberlaa on the southern fringe of Vienna delivered natural gas to the Vienna gas works for 10 years until they were exhausted.

After the occupation of Austria in 1938 exploratory drilling in the Zistersdorf oil fields was pushed energetically and production was increased considerably (1937: 32,000 t of oil, 1944: over 1.2 million t and over 149 million cu m natural gas).

In recent times the concentration of drillings shifted to the northern fringe of the March Plain and almost to the NE boundary of Greater Vienna.

Natural gas is being used to power installations in the oil field region and the thermal power plant in Neusiedl on the Zaya; in the villages in the oil field region, natural gas partly replaced solid combustibles and the Vienna gas and electricity works are also being supplied with this substance; placed in steel bottles, natural gas is used as motor fuel (trial drilling at Aderklaa in the March Plain, depth: 2,860 m). In 1952 the Vienna gas and electricity works used over 208 million cu m natural gas.

There are no official figures on the quantity of petroleum extracted (estimates for 1952: about 3 million t; 1951: 2.2 million t).

The Wels natural gas deposits have been tapped for many decades but are only of minor local significance. For a few years, until 1952, small quantities of heavy asphalt oil were obtained near Taufkirchen (Leoprechting, Upper Austria); this oil was processed together with the by-products of the VOEST coking plant in Linz.

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There may be other petroleum and natural gas deposits outside the Vienna Basin in the Alpine Foreland and in the Foreland in the East from the foot of the Koralpe Mountain and into Burgenland (Lispe oil fields in western Hungary, oil discoveries between Mur and Drau rivers in Yugoslavia). Oil might possibly also be found in the Leibnitz Plain, but the explorations are very expensive.

Oil slate is being mined near Seefeld and in the Baechen Valley (NW of Pertisau on Lake Achen) in Tirol.

Total production in 1952: about 750 t; 1937: 700 t, 1946: 2,600 t.

Petroleum-like substances (8-9% bituminous) contained in slate are found in dolomite. Through the carbonization of "oil or stinkstone" -- which has been under way in the North Tirolian Limestone Alps since the fourteenth century in various places -- one can obtain a tarry mass from which pharmaceutical products are prepared ("ichthyol," "Cehasol," etc); of these over 44 t worth more than 1.1 million schillings were exported in 1952.

Iron ore. More than seven-eights of the total volume mined come from Styria's Mt. Erzberg; the rest comes from Radmer, S of Hieflau in Styria, and from Huettenberg in Carinthia.

In addition to the 2 siderite ranges -- one in the northern graywacke zone from Admont to the vicinity of Gloggnitz, the other in the crystalline rock of the Central Alps from the northern Lavant Valley to Oberzeyring in Styria -- there are several smaller iron ore deposits which in earlier times formed the foundation for the charcoal

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blast furnaces but which today no longer suffice for the requirements of modern coke blast furnaces. Only the brown hematite ore deposits of Schaeferoetz still furnish the ore base for the charcoal blast furnaces of the nearby Konkordia foundry in Sulzau near Werfen.

Total volume mined in 1952: 2.65 million t; 1937: 1.8 million t; 1944: 3 million t; 1946: 0.46 million t. The ore reserves of Styria's Mt. Erzberg are estimated at over 200 million t, those at Radmer at 5 million t, and those of Huettenberg at 4 million t.

The iron ore deposits have a special effect of Austria's overall economy. The ores of Mt. Erzberg, Radmer, and Huettenberg are today being smelted in 3 blast furnaces in Donawitz and 3 to 4 in Linz. Now smelting processes made it possible to extract manganese from iron and to obtain 1,400-1,500 t of manganese annually. (Manganese is used in the refinement of steel. In 1952 manganese imports amounted to about 20,000 t, costing about 17 million schillings, from Great Britain, India, Sweden, Turkey, and other countries.)

The crude ore mining effort has been constantly stepped up since 1946 so that in the future the needs of the blast furnaces will be covered from domestic sources to an increasing degree; it will also be possible to put new blast furnaces into operation. In 1952 more than 0.6 million t of iron ores, worth more than 320 million schillings, had to be imported (e.g., from the US, Sweden, Great Britain, Spain, the Netherlands); these figures also include imports of roasted sulfur ore (e.g., from Italy, Sweden, West Germany).

Lead, zinc, and molybdenum ores, which always occur together, can be found in the Wetterstein limestone of the Alpine Triassic

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particularly in some places in the South Alps (Karawanken Range, Carnic Alps, and between the Gail and Drau valleys; the most important places where these ores are obtained today are in the area of Bleiberg-Kreuth near Villach.

Total volume mined in 1952: 120,000 t of crude ore; 1937: 116,000 t; 1946: 19,700 t. The established ore reserves in Bleiberg-Kreuth will be worth mining for another 2 decades.

The crude ore mined contains an average of 5% lead and up to 4% zinc metal and only 0.14 to 0.17% molybdenum. Modern processing installations enrich the crude substance, making zinc and lead concentrates out of it. The smelting of the lead concentrates, and the production of molybdenum lime (see note) are accomplished in the "Bleiberger Bergwerks-Union" plant in Arnoldstein-Gailitz. ([Note] Molybdenum lime is a basic material for the production of refined steel additives and for the production of molybdenum metal (melting point 2,600°).) The chemical plants connected with this plant use the by-products of lead and zinc production for sulfuric acid and lithopone, an important basic material for various industrial dyes and lacquers.

Lead production (in 1952 about 9,400 t, including more than 5,200 t made from domestic ores, scrap lead exploitation, and profitable smelting of concentrates from Raibl in Italy; 1937: 10,800 t) cannot quite cover domestic needs (about 9,000 t). The zinc concentrates still have to be exported for further smelting. A modern zinc smelter is to start operations in 1954 in Gailitz.

Copper ores are being mined in the copper veins of Mitterberg at the foot of Mt. Hochkoenig and at Buchberg SE of Bischofshofen

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as well as the grey copper ore veins (a quicksilver and silver containing antimony-arsenic-copper-grey-copper-ore) of Schwaz (graywacke zone).

Copper ore deposits can be found in several places in Austria (around Kitzbuehel, Untersulzbach Valley in Upper Pinzgau, etc); however, these are mostly minor ones far apart from each other; their metal content is small (chalcopyrite at Mitterberg today 2.2% Cu), the processing is expensive, and the profitability of mining depends on world market prices.

Mining in 1952: 138,000 t crude ore; 1937: 7,200 t; 1946: 5,500 t.

The crude ore is processed in Muehlbach near Bischofshofen; it is desulfurized in the copper smelter in Brixlegg where in 1952 more than 6,400 t of electrolyte copper were produced. About 2,100 t of refined copper were obtained from scrap copper. However Austria's annual requirement calls for 18,000 t.

The Schwaz grey copper ores also yield small quantities of silver and quicksilver (1952: 0.1 t and 0.5 t, respectively). The need must therefore be covered with imports.

Antimony ore has been mined for decades near Schlaining in Burgenland; the deposits at Rabant (NW of Oberdrauburg on the state boundary), known since the sixteenth century, were tapped for a while recently, but operations were discontinued in 1953 due to marketing difficulties.

Total production in 1952: about 12,000 t; 1937: 2,100 t; 1946: 800 t.

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The metal content of the crude ores amounts to 3-4%. The concentrates from Schlaining are being sold abroad; those from Rabant are being processed in the lead smelter of Gailitz in connection with the production of hard lead.

Bauxite is being mined above and below ground in layers of various thickness on Mt. Blahberger Hochkogel and on Mt. Praefingkogel in Unterlaussa (W of the railroad station at Weissenbach-St. Gallen/Ennstal).

Total production in 1952: about 15,000 t. The content of kaolin, iron, and silicic acid varies. This determines the use of the ore for corundum bauxite (higher silicic acid content), smelting bauxite (an additive for the VOEST blast furnaces with greater iron and silicic acid content), and aluminum bauxite (poorer in iron and silicic acid; exported to a West German clay earth factory since Austria has none).

Austria has rich magnesite deposits which are so important in the production of iron and steel. The largest deposit lies in the Central Alps near Radenthein (Carinthia). Others are in the Central Alps near St. Michael (Kraubath), in eastern Styria, and at Mixnitz (Breitenau). Deposits are also located in the graywacke zone from the Ziller Valley to Mt. Eichberg near Mt. Semmering; the largest of these are being tapped (Mayerhofen, Leogang, Trieben in the Palten Valley, Oberdorf near Bruck on the Mur, Veitsch).

Total mined in 1952: 740,000 t crude magnesite (36% thereof from Radenthein); 1937: 397,000 t; 1946: 91,500 t.

In 1952 more than 280,000 t in more or less refined form (more than half in the form of magnesite bricks and plates) were exported to 37 countries throughout the world bringing an income of about 546 million schillings.

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Austria originated the use of magnesite in the smelting industry (fireproof brick, compressed furnace lining substance, etc). Austrians invented the "Heraklith" building boards (wood fiber and magnesite) and the production of magnesium metal through electrothermal processes. Until the early years of the twentieth century Austria held a virtual monopoly in magnesite production.

Graphite is being mined near Muehldorf NW of Spitz on the Danube, Kaisersberg-Leims near Leoben, and in Hohentauern.

Graphite occurs in the gneiss and marble of the Lower Austrian Waldviertel section in a strip of land from Persenbeu via Muehldorf, Roehrenbach near Horn and up to Drosendorf, as well as in the graywacke zone from the upper Enns Valley via the Liesing and Palten valleys into the Semmering area. The lenticular positioning explains the many mines which are not in operation now or were abandoned entirely.

Total mined in 1952: 19,700 t raw graphite; 1937: 18,200 t; 1946: 240 t. The Styrian graphite is also used in the production of soldering crucibles and molds. About 13,500 t of raw graphite valued at 10.2 million schillings were exported in 1952 (to West Germany, Poland, Italy, and 11 other countries); 278 t valued at 0.85 million schillings were imported mainly for pencil production (one imported t had 4 times the value of an Austrian t).

Austria is one of the countries with the most graphite deposits; it must be said however that graphite found in Germany, Czechoslovakia, Ceylon, and Madagascar are finer and of higher quality.

Salt is being mined in the range of the Werfen slate near Altaussee, Hallstatt, Bad Ischl, Hallein, and Solbad Hall in Tirol.

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Total mined in 1952: 82,000 t; 1937: 80,100 t; 1946: 78,600 t. Stone salt mining is a minor operation.

The presence of salt is due to uniform salt deposits which as a result of the folding of the Alps and the movement of the covers were torn up, mixed with clay, marl, gypsum, and anhydrite, and pressed upward in the form of a boss ("Hasel Mountains"). The full depth of the deposits has not been reached in any salt mine as yet. The salt content of the Hasel Mountains in general increases going from W to E. Salt brine is obtained by leaching out hollow areas; the salt brine is piped into brewing huts where it is evaporated, giving cooking salt. There are brewing huts at all mines and there is one in Ebensee; this one alone could cover Austria's total salt requirement. Ebensee is the end of a salt brine pipeline from Hallstatt via Bad Ischl where another one comes in from the salt mountain at Altaussee and through the Rettenbach Valley. Chemical plants in Ebensee and Hallein take the salt brine and produce soda, caustic soda, calcium chloride, hydrochloric acid, etc. It is also used for therapeutic purposes (Bad Aussee, Goisern, Ischl, Solbad Hall).

The production covers the needs of Austria as far as cooking salt is concerned; it also covers industrial needs. Exports are minor (1952: about 2,000 t valued at one million schillings to Yugoslavia and Czechoslovakia).

Salt mining is a government monopoly; it has been in the hands of the local princes since the Middle Ages.

Kaolin is today being mined in Kriechbaum near Schwertberg in Upper Austria, in Zoebern near Aspang, and in Mallersbach near Retz in Lower Austria.

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Total mined in 1952: about 200,000 t raw kaolin; 1937: 153,600 t; 1946: 47,200 t. The processing results in roughly 20-30% pure kaolin. The deposits at Kriechbaum and Mallersbach are genuine kaolin -- the product of the decomposition of feldspar (granite, gneiss) -- and can also be used in ceramics. The deposit near Aspang grew out of Sericite slate and can be used only as filling material in the paper and rubber industries. Kaolin exports, mainly to such neighboring countries as Italy, West Germany, Switzerland, and Poland, brought an income of 8.8 million schillings in 1952. For the production of refined porcelain goods at home, small quantities of porcelain earth are being imported from Czechoslovakia, West Germany, and Great Britain (in 1952 values at 1 and 1/3 million schillings).

The other minerals listed in Table 5 in general are used by domestic industry.

One might stress that talcum exports in 1952 brought 16.8 million schillings and helped improve the trade balance (e.g., with West Germany, Poland, Hungary, East Germany, Holland).

The value of the mining industry as a whole in 1952 amounted to 2.2 billion schillings, i.e., about 4% of the national income (55.3 billion schillings). The value of the exported mining products (not counting petroleum and natural gas) amounted to 667 million schillings.

4. Electric Power(Table 6)

Today a nation's power industry is of the utmost importance.

Depending on the type of power, we distinguish between

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thermoelectric and hydroelectric power plants. The latter are powered either by rivers (continuous operation, river dam plants) or they receive water from reservoirs (reservoir plants).

The most important thermal power plants which serve the public are the installations of the Vienna Power Plants in Simmering and Engerthstrasse, St. Andrae, Timelkam, Voitsberg; larger thermal power plants, which produce for their own needs are those in Linz (VOEST), Lenzing, Donawitz, Fohsndorf. The plants of the public network in 1949 still obtained 45% of the coal consumed from abroad, in 1952 only 16%.

Coal-poor Austria is increasingly using its rich water power resources for power production.

In 1952 there were roughly 500 power enterprises with an individual capacity of 200 kw and up; about three-fourths of their plants were hydroelectric.

From 1945 to 1953 the following major power plants commenced operations: Fleiss Creek (Heiligenblut), Hollersbach (Pinzgau), Salza (St. Martin on Mt. Grimming), Staning, Rott (Salzburg), Latschau (Ill River power plant), Kaprun main step, Kolbnitz (Reisseck-Kreuzeck group, Carinthia), Dionysen (Mur), Thurnberg-Wegscheid and Dobra-Krumau (Kamp River), Gerlos, and -- using a new drinking water pipeline for Innsbruck -- Muehlau (Tirol) as well as the railroad power plants Stubachtal III and Braz (Vorarlberg). Machinery was added in many existing plants. The water quantities stored were increased through creek diversions (e.g., at the Ill River power plant, to Lake Achen), heightening of dams (e.g., Ranna, Hierzmann Dam of the Teigitsch power plant), and

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installation of pumping facilities. Along with this came the necessary expansion of the transformer plants and the high tension lines.

In 1952 the total power production amounted to 8,032 million kwh (public power plants 78%, enterprise plants 17%, railroad power plants 5%), i.e., 2.8 times the figure of 1937. Imports amounted to 85 million, exports to 1,060 million; including the losses this makes a total domestic consumption of 7,057 million kwh. Of this figure, industry used 56%, homes only 8.5%, and agriculture 1.6%. Of the roughly 470,000 farms, about 70,000 had no electricity at the end of 1952. The largest consumers are the Ranshofen aluminum plant (1952: 10.6% of the public power produced) and the Linz nitrogen plant.

In 1937 Austria consumed 428 kwh per capita; in 1952 the figure was 1,000 kwh. (Cf.the 1950 consumption figure for Spain, 260 kwh; Italy, 500 kwh; West Germany 1,000; Switzerland, 2,200; Sweden, 2,600.)

In order to be able to cover the constantly rising power requirements, the power industry must increase its production, transformer, and distributing facilities by 7% annually.

In recent years new projects were therefore launched, such as the Inn power plant at Braunau-Simbach in coordination with Bavaria (current sharing) and the Ottenstein power plant of the Kamp power plant chain (Lower Austria). Together with the Rhine-Main-Danube Company, to which also belongs the Kachlet plant above Passau, construction has been started on a Danube power plant near Jochenstein (current sharing). Other facilities, such as the Ill River power plant, the upper step at Kaprun, and the installations of the Reisseck-Kreuzeck group are being expanded. The Persenbeu Danube power plant begun during the war became Austrian property in 1953 and is being expanded. With its balanced water volume, the Danube

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has for many years been a prime objective for power plant construction. An additional 10 storage dam steps have been planned; once these have been completed, the total production of all Austrian Danube power plants will amount to almost 11 billion kwh per year on an average.

The electric sections of the Federal Railroads require a special type of power. This power therefore had to be produced in railroad power plants until now (Vorarlberg: Lake Spuller and Braz power plants; the latter is Austria's first underground power plant; Tirol: Ruetz plant, railroad power installations of the Lake Achen power plant; Salzburg: 3 plants in the Stubach Valley; Carinthia: Obervellach; Upper Austria: Steeg railroad power plant) and had to be carried by special railroad power lines. Additional railroad power requirements are to be filled from the regular public network.

Austria has a great future as power exporter.

The power obtainable from Austria's hydroelectric power plants is estimated at over 40 billion kwh. These riches as early as 1922 led to an agreement with German and Swiss interests which resulted in the exploitation of the Ill River. Additional long-range export agreements were made with Bavarian consumers for power exports from Tirol. In 1952 it was possible to export 13% of the annual production which brought 166.8 million schillings. In order to make it possible to export power, there must be efficient power lines. The high tension line from the Ill power plant (Buers) via southwestern Germany into the Ruhr area (Brauweiler) today represents the backbone of the Central and West European public network. A European public network can be expected only when there is a network of 380,000 v connecting the various

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countries. In 1953 an overland line was built to Italy from Lienz via the Lienz Dolomites and the Carnic Alps to Pelos in the Piave Valley; this line delivers power to the upper Italian industrial region.

The following rivers are especially adapted for additional power facilities: the Oetztaler River, the Inn between the Swiss border and Landeck and along the section from the mouth of the Salzach to the mouth of the Danube, the Isel in East Tirol, the Bregenz River, and the Salzach River.

5. The Trades

The trades hold a major position in Austria's overall economy. It heads all employment groups with about 180,000 enterprises and almost 600,000 employees. Including family members, almost one-fourth of the population makes a living in this manner.

The trades produce mostly finished products. They are very progressive, receptive to technological innovations, and active. The individual shaping of the product, the good quality, and the variety which makes it possible to fulfill the wishes of individual customers -- these things cannot be surpassed by any sort of mass production. The trades account for an average of 15% of exports and 20% of imports.

6. Industry

Industry originally developed above all in areas which had their own raw materials or power; we speak of local or base-bound industry. The following factors influenced the further development and the current status: the increased local needs, the endeavor to produce certain goods in the country, the world market conditions,

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and the possibilities created by the land and transportation, as well as in recent times the situation arising our of World War II.

The geographic grouping of Austrian industry has always made Vienna the center of consumer goods production (these goods include clothing, furniture, soap, bricks, rails, etc) while the other federal states contain the raw materials deposits and thus became centers of the producer goods industry (including such items as machines, tools and appliances, used in the production of consumer goods) and of mining. During World War II new industries sprang up in some regions (e.g., VOEST, aluminum production in Ranshofen, nitrogen plant in Linz, celluloso production in Lenzing). A welcome shot in the arm was represented by those enterprises which were set up in 1945 by German-speaking people who had been driven out of occupied areas (e.g., textiles, glass and glass jewelry, organs, large printing plants). In the case of newly to be established industrial enterprises, the federal state governments have a say in the planning and location of the plants, partly in order to keep industrial installations away from tourist centers.

The largest industrial region is Vienna with its Vienna Bay; industry pushes also into the Triesting and Piesting valleys in the form of a huge lobe. The state capitals are also industry centers. One such region extends from Linz to Wels, from Salzburg to Golling, and from Innsbruck to Kufstein. The Rhine Valley S of Bregenz is Vorarlberg's industrial region. Graz lies in the middle of a strip of land which extends along the Mur from Mixnitz over the Graz Plain to Wildon, while Klagenfurt's industrial region covers only the immediate vicinity of the city. Other industrial regions are found

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around Landeck and Villach; they follow the brown coal deposits of western Styria and grow dense especially in upper Styria (Mur River -- Muerz River line and their side valleys), conditioned by the nearby Mt. Erzberg and the coal, magnesite, and graphite deposits. Industry concentrations can also be found in the middle Ager and Traun valleys, in the Enns Valley around Steyr, in the Ybbs Valley between Waidhofen and Amstetten, in the Traisen Valley between St. Aegyd and St. Poelten and in the northwestern Waldviertel area (Gross-sieghart to Waidhofen, Gmuend to Litschau).

In 1950 Austria's approximately 3,920 industrial enterprises employed about 500,000 people.

An interesting sidelight on the changing conditions can be obtained from the following survey on the 1950 industrial employment situation compared to that of 1936 (= 100%): Salzburg 345%; Upper Austria 290%; Tirol 265%; Styria 215%; Carinthia 210%; Burgenland 175%; Vorarlberg 170%, Lower Austria 145%; Vienna 140%.

The iron and steel industry. The iron and steel industry is of decisive importance to Austria because its products serve as basic materials for many branches of the economy and because the export of iron and steel products makes it possible for Austria to import vitally needed goods.

The new plants set up during the war brought a considerable increase in Austria's iron industry capacity. Despite extensive destruction and other damage, it was possible to produce over 1.1 million t of pig iron and over one million t of crude steel in 1952; this is 3 times, respectively 1.6 times, the figures of 1937.

Since Austria simply had to export these items it was not

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possible to cover all domestic requirements in this field in 1952. This industrial branch must import large quantities of coal, coke, ore alloy metals, and scrap iron for its own use. In addition to pig iron, refined steel was exported to 49 countries throughout the world in 1952 (steel production in Europe's major industrial countries in 1952 in million t: Great Britain 16.1, West Germany 15.5, France 10.7, Belgium 5, Luxemburg 3, Italy 3.4, Saar region 2.8, Sweden 1.5, Austria one).

The foundry industry today assumes a key position through its processing of pig iron and crude steel.

In the past castings for daily use (such as pressure and drainage pipes, ovens, stoves, radiators, heating tanks) were the main products; today the machine industry, the vehicle and electrical industry, and the iron foundries are the main customers. The most important chilled roll iron plant is in Salzburg (Sulzau-Werfen).

The machine building, steel construction, and iron construction industry produces for instance construction, mining, and foundry machinery, hoisting equipment, conveying machines, elevators, steam boilers, apparatus, pumps, turbines; it builds ships and produces the most varied power and work machinery for industry and the trades.

Locomotives and railroad cars of all types are being produced not only for domestic use, but also for foreign customers (Poland, Czechoslovakia, Turkey, Egypt, India, Colombia, etc); this also applies to ball bearings, farm machinery, combustion engines, shop scaffoldings of steel. The production of machines which turn out all kinds of plates and boards, of automatic weaving looms, of special paper machines, and Diesel works locomotives was resumed, as was the construction

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of mowing blade and grinding machines, grain washing machines, etc which eases the import requirements in this respect. (Export value in 1952: 810 million schillings; passive trade balance: 420 million schillings.)

The vehicle industry produces mostly trucks, buses, motorcycles, bicycles, and tractors. Passenger cars are being produced at this time in rather small numbers through so-called assembling. The necessary parts are being imported in exchange for raw materials and semifinished products made of metal.

Although the production of these vehicles is being increased constantly, one cannot speak of mass production such as it exists in large countries. (Production in March 1953: 182 trucks (increase over 1937: 202%), 33 buses (330%), 4,079 motorcycles (647%), 11,540 bicycles, 1,166 tractors. West Germany's Volkswagen plant in the fall of 1953 produced a daily average of 1,000 passenger cars.) Due to their good quality, these products are being sold in countries throughout the world (export value in 1952: about 285 million schillings, passive trade balance: 34 million schillings).

The iron and metal goods industry produces a wide variety of semifinished items (such as drawn wire, screws, nuts, bolts, nails, etc) and finished products (armatures, locks, tubes, construction articles, etc) which are delivered in fulfillment of special orders from large customers. Other finished products (e.g., pots and pans, stoves, heating and cooking units, lighting units, tools, scythes, sickles, metal furniture, vats and tanks, table silver, ornaments, fine mechanics and optical items, surgical and physical instruments, mechanical toys) are channeled directly into consumption, i.e., to the small-scale consumer.

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The iron goods industry depends heavily on exports (it is oriented toward exports) and gets its raw materials and auxiliary materials (wood, textiles, paper, etc) mostly from domestic sources. In contrast, the metal goods industry must import its raw materials -- with the exception of aluminum; its potential is not being exploited fully. Exports only came to a fraction of the 1937 figure. Of the many iron goods which were exported, scythes and sickles are still important despite the mechanization of agriculture. In 1952 about 2.7 million pieces were exported to many countries (export value: 40 million schillings). Hunting rifles made in Ferlach and Steyr are world famous. Austria holds an important position in the production of scientific instruments (microscopes, etc).

The aluminum plant at Ranshofen (Upper Austria), despite its need for alumina imports, is an important foreign currency source (production in 1952: 31,000 t, 1951: 21,300 t; capacity: 54,000 t).

The electrical industry, whose products are famous beyond Austria's borders, produces practically everything needed in the way of electric machinery and equipment -- from generators and transformers with maximum capacity, from electric locomotives, the most varied engines for all economic branches, to household articles and light bulbs; from telephones and radios (see note) and x-ray equipment to the latest ultrasound equipment, as well as all kinds of electric appliances. ([Note] The basic item needed in a radio -- the detector tube -- was invented by doctor Lieben, an Austrian.)

This industry branch has, among others, 5 large-scale plants with more than 1,000 employees each. The high export figures of the electric industry in 1952 (343 million schillings) nevertheless

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brought a positive trade balance of only 26 million schillings. Transformers and converters, measuring instruments, phones, and radios brought a large export surplus.

The wood processing industry includes first of all the sawmills. These are frequently tied in with water power and are partly combined with agricultural and forestry enterprises, partly set up as independent industry branches. They produce lumber which in the form of construction lumber covers a considerable part of the total exports. The wood processing industry is very much oriented toward exports.

Major export items are wooden houses, which are sold not only in Europe but sometimes also in Persia, Israel, Australia, New Zealand, and South America, as well as fruit crates and other wooded boxes which are sold to countries exporting tropical and other fruit. The piano factories also use wood. An average of 90% of the pianos made in Vienna are sold abroad. The ski manufacturers can increase their foreign orders particularly when Austria's skiers win in competitive events.

The paper, cellulose, wood fiber, and cardboard industry is an important part of Austria's economy.

Most of the wood used and some of the auxiliary materials come from domestic sources. Additional wood for polishing and grinding is imported from Yugoslavia. In 1952 this industry had 84 enterprises with 105 plants; of these 18 produced only paper (from paper used for currency to the finest tissue paper), 66 produced only cellulose, wood fiber, or cardboard (from wood fiber to pressboard and artificial leather). In 1952 production (0.25 million t) was greater than during

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1937. Exports in 1952 amounted to 1.1 billion schillings; of this sum however only slightly more than half was accounted for by semi-finished and finished products. Printing paper was sold in 36 countries. By-products are alcohol, yeast, and other chemicals. (Total paper production of all countries in 1950: 25 million t, Austria: 0.24 million t.)

The development of a stone and ceramics industry depends on the nature of the soil in various areas. The deposits of marl and loess form the foundation for a widespread brick industry; today this industry consists mostly of large plants which use machinery. The brick industry in Austria still furnishes most of the construction materials for building construction.

Another important branch of the construction materials industry is cement production.

In 1952 it consisted of 14 plants with an annual capacity of 1.3 million t of early-hardening portland cement. The asbestos cement industry produces shingles, pipes, etc. The first cement asbestos slate was produced in Austria.

The lime industry works not only for the construction industry but also for the iron, chemical, leather, and sugar industries and for agriculture.

The production potential amounts to about 600,000 t of burnt lime, or twice as much as in 1938.

Light building boards made of wood fiber and magnesite ("Heraklith") and wood fiber with cement binding are being sold increasingly, A considerable portion is being exported.

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The variety of stone materials brought about the development of an important natural stone industry which produces stones for construction projects.

The most important stone and cobblestone enterprises are located in the granite region of Schaerding, Mauthausen, and in the Lower Austrian Waldviertel area.

Granite, hard limestone, and basalt of Mt. Pauliberg are used by the gravel enterprises which produce the materials for roads and railroad superstructures. The marble limestone and the easily processed Leitha limestone furnished the material for the magnificent edifices and works of art for which Austria is known. The fireproof clay and silicate industry is an important auxiliary industry for all production branches working with high temperatures, above all the smelting industry. Some of the raw materials have to be imported. The domestic raw clay, within certain quality limitations, covers the domestic requirements. The stoneware industry (3 enterprises) produces first of all stoneware pipes and sections for canals which however cannot cover domestic requirements. The fine ceramics industry is divided into the following branches: porcelain, fayence, and ceramics (terra cotta). Decorative and luxury porcelain is represented by Vienna's world famous "Augarten" factory.

Consumer porcelain is being produced by 3 plants which were set up after 1945; by 1952 they were however still not able to fill all needs.

The glass industry with its glassworks and processing establishments is based mostly on Austrian raw materials. As a result of

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its expansion and rationalization (automation) the industry can produce more than just for domestic needs in all kinds of glass articles. Considerable quantities of high quality items are being exported. This is especially important since glass production is particularly "wage-heavy" (i.e., the portion of the costs represented by wages is rather high compared to the costs of the raw material).

The Austrian glass industry can look back on centuries of tradition. In areas where there was quartz and wood for glassworks, small plants were set up in the distant past, e.g., in the forest regions of Lower and Upper Austria and in the central Alps. Following the conversion to coal, the plants moved to the vicinity of coal mines (Oberdorf-Voitsberg, Koeflach); since the intensive growth of transportation facilities, most glassworks are no longer bound to certain locations. After 1945 new glassworks were set up (Vienna, Ramingdorf in Lower Austria, Linz, Bad Ischl, city of Salzburg, Mitterberg S of Bischofshofen, and Kufstein). All kinds of glass for all kinds of purposes is being produced. Glass specialists who had to leave their homes as a result of the population movements after World War II contributed greatly to the expansion of this industry branch.

Glass goods exports, especially exports of high quality goods, have been increasing since 1947. In 1952 glass exports were valued at 325 million schillings (positive trade balance: 294 million schillings), of which figure nearly 100 million schillings were accounted for by Tirolian glass jewelry. In 1951 the glass industry employed about 10,000 people.

Some of the newly immigrated "Gablonz" glass goods (glass and metal jewelry) producers after 1945 settled in Losensteinleiten,

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Kremsmuenster, Steyr, Linz, and Wels and established a new industry in these places. Their products in 1952 attained an export value of roughly 90 million schillings.

Although the chemical industry had nearly doubled its 1937 production figure in 1951, although new plants were set up and new products were coming out, it can fill Austria's needs only in some branches since the necessary raw materials or production sites are lacking.

Of special importance, particularly for export, are the products of the nitrogen plant in Linz which turns out various kinds of artificial fertilizer, acids, medication, etc. Artificial fertilizer exports amounted to 2.5% of Austria's total export value in 1952. Other plants produced many kinds of chemicals from domestic raw materials which are used by other industries; among these the staple fiber plant and the paper factories are major customers.

The Semperit plant holds a key position in Central Europe's rubber industry; this plant produces almost all rubber articles for daily use from imported raw rubber. Several other rubber plants produce certain special items. The synthetics industry, which also produces synthetic fibers, is becoming more important all the time. The domestic needs however still cannot be covered entirely. Raw material procurement for the dyestuff and pharmaceutical industry is quite a problem. The chemical industry also produces excellent new textile and leather "auxiliary" materials which in the future will noticeably ease the textile and leather supply situation. Match factories depend on exports since the domestic market for their products shrank to about 60% of the prewar figure. Chemical plants are

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also connected with the major gas works; these plants process by-products. Photographic material is not being produced in Austria at this time; small quantities of photographic paper are being turned out.

The graphic industry is first-class; at times it fills foreign printing orders. The Cartographic Institute in Vienna has always been producing excellent maps which were highly valued also abroad. The other cartographic enterprises (Freytag-Berndt and Artaria, Hoelzel Publishers) also produce excellent atlases and wall maps.

The textile industry, whose linen and sheepwool branches were originally tied to specific local areas, consists of the wool, cotton, flax, hemp, jute, silk, and artificial silk ("Rayon") branches. In 1938 the staple fiber branch was added. By its very nature the textile industry is a refining industry, for the raw materials, such as cotton, silk, and jute must be imported entirely, and wool, flax, hemp, and artificial silk must be imported in a major portion. In this manner textiles in Austria are completely dependent on the world market with respect to quantity and prices. The situation is eased somewhat by the products of the only artificial silk plant (St. Poelten) and the only staple fiber factory (Lenzing).

The considerable trade volume (value of imports and exports) of the textile industry has been shrinking since 1950 (one-sixth of the total trade volume) and in 1952 was roughly one-tenth of that volume. In 1952 the ratio of import value to export value was 6.5:5. Austrian fashions are carried to all parts of the world by the highly fashion conscious knitware and woven goods industry and by readymade women's dresses and blouses; on the world market however these products meet stiff competition. About 95% of the products of

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the Vorarlberg lace industry were exported in 1952 (revenue: 105 million schillings). The exports of finished and unfinished hats (1952: 90% of the production, income: 25 million schillings), handkerchiefs, etc brought in considerable amounts of foreign currency.

The leather industry. The raw hides obtained in Austria can cover only about 60% of the needs of the leather industry. The remainder must be imported. The industrial rapid tanning process requires foreign tanning bark, extracts, and fruits (main sources: Turkey, Union of South Africa, and Argentina). In this manner the leather production and processing industry is heavily dependent on world market prices. Small quantities of leather are being exported.

The shoe industry uses a considerable portion of the leather and is able to meet domestic requirements which have shrunk compared to 1938. Shoe exports are small compared to 1938. The increasing popularity of rubber soles somewhat eases the leather sole supply situation.

Vienna is the production center for leather luxury articles. The importance of this industry as an exporter of such articles has declined.

The food industry consists of about 30 production branches.

Of the more than 4,000 mills in Austria, most are small water mills which in many cases are linked with other enterprises. The most important industrial mills are in Lower Austria. In view of existing conditions the production potential cannot be exploited fully.

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The sugar industry processes sugar beets in 7 plants at this time; 5 are in Lower Austria (Leopoldsdorf, Bruck on the Leitha, Hohenau, Duernkrut, Tulln), one is in Upper Austria (Enns), and one is in Burgenland (Siegendorf) (the Hirm sugar factory in Burgenland has been closed due to lack of machinery).

A few years prior to 1938 the sugar industry was able to cover domestic needs. In 1945 and 1946 only the Enns sugar factory was in operation. In 1951 and 1952 domestic beets yielded about 145,000 t white sugar which sufficed to cover 75% of the requirements. Imports came from Peru, Cuba, and the East European countries. It is hoped that Austria will be independent of foreign sugar within a few years.

The tobacco industry which is a government monopoly in Austria, has 6 plants; these are located in Vienna, Hainburg, Krems, Linz, Fuerstenfeld, and Schwaz. The raw material comes mostly from abroad.

Austria annually consumes 8,000 to 10,000 t of raw tobacco of which quantity in 1952 about 2,600 t came from Greece, 2,400 t from the US, and the rest -- depending on the annual trade agreements -- from Turkey, Yugoslavia, Brazil, India, South Africa, the Dominican Republic, etc.

In 1952 more than 6.9 billion cigarettes were sold; this represents an increase of 60% over 1937. The total tobacco consumption however only amounts to a little more than 90% of the 1937 figure.

Even before 1950 smokers spent a total of about 1.6 billion schillings; of this figure, 998 million schillings were taxes (1952:

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1,126 million schillings); in this manner smokers contributed about one-eighth of the total taxes paid in 1950.

Nationalized Enterprises in Austria

In 1946 and 1947 the National Council passed laws nationalizing the most important credit institutions, the major coal mines, the nonferrous metals mines, most petroleum extraction and processing enterprises, the largest iron and steel industry enterprises, as well as a number of large enterprises of the machine-building industry, the electric industry, and transportation. Large power plants were either nationalized or they became "public property," i.e., the federal government and the federal states participate in them.

The occupation powers made the government the custodian of a number of industrial enterprises, installations, and property values, so-called "German property."

The nationalized industry in 1951 employed about 100,000 workers, i.e., 22% of the total industrial working force. It also contributed 22% to the total industrial output and in 1952 accounted for more than one-fourth (2.8 billion schillings) of the total export income.

7. Austrian Foreign Trade

(a) General

The relationship between the food requirements, raw materials, and finished products and its coverage through domestic sources forms the basis of trade between nations. Excess requirements must be covered through imports. Each country tries to cover this requirement by increasing its own production of the particular items and to

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eliminate imports which cause a drain of its own currency to foreign countries. On the other hand each country tries to sell its surplus abroad in order to keep its people employed and perhaps to hire more people, thus maintaining or improving its standard of living. If there were a country which can cover all its needs through its own sources, such a country would be considered autarchic. Recent efforts by a number of countries to attain such a state have been unsuccessful on the world economic scene. If the standard of living of certain nations is not to drop and if that of other nations, which are underdeveloped, is to be raised, an exchange of goods between nations is an economic and therefore also cultural necessity. Each country tries to attain at least a balance in the relationship between imports and exports, which is called its trade balance. The trade balance can be "favorable," "unfavorable," or "even." It can happen that the meeting of domestic requirements is pushed far into the background in order to make exports possible and thus to improve the trade balance or perhaps to make it possible to import vital goods, or the import of nonessential goods might be cut off. (Various world organizations, in the interest of the functioning of world trade, are trying to ease import curbs or remove them on certain goods ("liberalized goods") through international agreements.)

Each country endeavors to obtain revenues ("finance duties") through import duties on such goods as permit such action, e.g., duties on passenger cars, coffee, tea. In the case of other goods which are also produced at home, domestic industry is protected through high tariffs against the competition offered by imported goods ("protective tariffs"), e.g., duties on tobacco products. Under certain circumstances the government may also make it difficult to export

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certain articles through export duties or it might cut off imports or exports of certain goods entirely through various measures. (Item in economic section of a newspaper. "Vienna-Buenos Aires trade agreement; Buenos Aires, 22 August 1951. Austria and Argentina concluded a trade agreement covering the coming 12-month period and providing for 60 million dollars worth of goods to be exchanged. It was announced last night that the 2 countries have exchanged diplomatic notes to that effect. In accordance with the agreement, Argentina is to deliver to Austria: grain for 9 million dollars, rice for 3 million dollars, wool for 5 million dollars, and wheat, meat, meat products, and fruit. Austria is to deliver to Argentina: iron and steel for 3 million dollars, lumber for 3 million dollars, and printing machines, as well as other industrial products.")

The finances are usually handled by the government banks of the 2 countries. This is called "clearing." With some states there are no trade agreements. In this case the value of exported goods must be equal to the value of imported goods. This is called "compensation" trade. Some goods are more expensive to produce in Austria than abroad. In order to make it possible even for such goods to be exported, an additional charge is slapped on the price in Austria, or the government eases the situation to some extent (repayment of business taxes).

If a country, e.g., Austria is forced to export as much as possible, it can happen that the trade partner will also insist on the particular country's acceptance of goods which it may not need as badly as others. In general all countries try to export as many finished products as possible and to import only raw materials, if possible. The selling of finished products abroad creates increased employment possibilities; finished products are "work-heavy or wage heavy."

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(b) Overall Trade

Trade is a part of the economy of a country. Like the latter, it is an organism and it is subject to constant changes. The type of goods, the quantity, the prices, and the trade partners change. Trade is also easily influenced by world political events.

Exports depend, among others, on the ability to compete on the world market (quality and price structure), the general demand for goods, and the possibilities of the trade partner. Imports depend, among others, on the domestic needs for the daily necessities, the increase in domestic production, and the buying power of the population.

Austria's overall trade structure in 1952 is illustrated in Table 7. As always, imports consisted mostly of food and raw materials. The export surplus consisting of finished and semi-finished goods did not suffice to make the trade balance a favorable one. It is unfavorable.

In comparison to prewar days the exchange conditions have grown considerably worse. The prices of imported goods rose more on the average (9.3-fold increase) than the average prices of exported goods (8-fold increase). If all prices of imported and exported goods had remained the same since 1937, or if the import and export prices had risen uniformly, the goods exported in 1952 for the first time since 1946 would have represented a somewhat higher value than the pure business imports (imports without auxiliary deliveries), i.e., the balance of the pure business volume for 1952 would have been favorable. The situation was similar in 1951. Under such conditions Austria would have needed but little foreign aid during those

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years in order to balance its import requirements. However the imported food and raw materials revealed an above-average price increase, while Austrian export goods were sold at rather low prices. Among these goods there are many items which do not seem essential abroad and which therefore are often subject to high duties and other import obstacles. In many cases other countries can deliver these goods cheaper.

In 1952 Austria was still dependent on aid -- gifts from abroad for the reconstruction of its economy -- which began to arrive in 1948 and before. Of the almost 2 billion schillings (almost 15% of the total imports) received during 1952, more than half was accounted for by grain; the coal, weaving materials, and machinery shipments were also considerable.

Further illustrations, whose figures are soon outdated, are given below and should be considered merely as examples; they are designed to offer an insight into the difficult conditions of Austrian foreign trade.

(c) Imports

Important import goods are listed in Table 8.

The 23 groups of goods listed account for about 75% of the total import value. The rest belonged to 62 other groups. The percentage figures for the import values of the year 1937 in part reveal considerable changes.

Grain imports were quite considerable. The live animal imports not listed in the table, dropped to one% in the case of pigs, and 11% in the case of cattle, compared to the 1937 figures. This is due to the development of the Austrian landscape, though one must

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consider that the meat consumption of the population today is lower than in 1937. The shortage of fats (lack of swine for fat production, lack of fat-yielding plants) was made up for through increased imports of edible fats and edible oils. Almost one-sixth of the total import value consisted of coal and coke. In addition to the price rises, the quantity increases also played a role (in imports 60% increase over 1937 despite continuing electrification); this increase is due to the increasing consumption on the part of industry. The increased ore imports were not so much expressed in values; quantity-wise it is 10 times as large as in 1937. Imports of various machines and equipment were considerable; they accounted for almost 10% of the total import volume. Wool and cotton imports dropped considerably (quantity-wise 49%, respectively 34% of 1937); this decrease is made up for through the use of staple fiber which was not at all produced in Austria in 1937.

The most important source countries are listed in Table 7.

Value-wise 92% of Austria's imports came from the 17 countries listed; thus the remaining 62 countries of the world from which Austria was buying goods in 1952, accounted for only one-twelfth of the value of imports. A comparison to 1937 will reveal quite a few changes. Some of Austria's neighbors have cut their imports from Austria considerably (Hungary, Czechoslovakia, Yugoslavia) These countries in the past delivered many farm products; their economy is now in the process of being shifted to other tasks.

(d) Exports

Important export goods are shown in Table 9.

The 17 groups of goods listed account for about 86% of the

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export values. The rest is covered by 60 others. Exports, like imports, changed considerably compared to prewar days.

In the group of exported raw materials we must mention first of all lumber. Quantity-wise exports amounted to 96% of 1937; due to the above-average world market prices, this item accounted for 20% of the total export value. It would be desirable to export less lumber and more finished wood products, e.g., paper. World market prices on paper dropped considerably in 1952. The Austrian paper industry was unable to keep up with this price drop due to the high domestic lumber prices. For this reason the paper export value figure of 10% in 1951 was almost cut in half. Iron and steel exports rose. Staple fiber, Gablonz articles, machines, and equipment, as well as magnesite products found a good market. Artificial fertilizer exports rose to 2.5% of the total. Electric power exports were also considerable. However all goods which must meet higher requirements and which presuppose solvent customers, suffered great sales difficulties; men's and women's clothing for instance could be sold only to the extent of 7% of the prewar figure.

The raw materials lumber, iron, and magnesite in general furnishes the basis for exports. These raw materials, the semi-finished and finished products made from them, and the exported electric power in 1952 accounted for about 70% of the total export value.

The most important customer countries are listed in Table 7.

Value-wise, more than 85% of the total exports were shipped to the 17 countries listed. The rest went to 63 other countries.

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The US is not only one of the most important sources of imports due to its foreign aid program, but it also buys more products in comparison to prewar days. Of the other overseas countries with which trade increased in recent years we must emphasize Argentina. Trade with West Germany increased greatly, that with Italy remained the same.

The most important transshipment port for Austria's overseas trade is Triest. Then come Bremen, Hamburg, Rotterdam, Amsterdam, and Genoa.

In 1952 Austria's goods turnover in these ports amounted to about 3.1 million t (imports 2.1 million t, exports one million t). In 1952 71% of the imports and 51% of the exports were shipped via Triest.

(e) Trade Balance

Whether the trade balance with the various countries is favorable or unfavorable, depends on certain conditions.

The import surplus arises mostly in trade with economically powerful or raw material rich countries, e.g., the US, West Germany, Great Britain, the Belgium-Luxemburg economic union, Sweden, and Poland. The largest export surplus in recent years was attained in trade with Italy.

Since 1946 Austria's economy succeeded in increasing not only the value but also the quality of its imports and exports.

We can make a reasonably correct evaluation only if we substitute for the 1952 trade volume the 1937 prices, thus adjusting the price changes. The pure business imports in 1952 only attained 89% of the 1937 figure; exports came to 109% (1951: 110%, 1950: 101%).

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(f) Payments Balance

The trade balance illustrates only a part of the economic relations with foreign countries. The true picture can be gained only from the payments balance which is established by the Austrian National Bank.

Austria has had an unfavorable trade balance since the founding of the republic. In addition to the debts owed foreign countries, we have the costs of shipping, mail and communications, the diplomatic service, the trips of Austrians abroad; foreign patents, licenses, authorship fees, and interest on loans must also be taken care of. These debts are however counterbalanced by certain assets: payments for electric power exported, freight charges for goods and mail shipped through the country, the expenditures of foreign diplomats, income from tourist trade, other "services" (patents, licenses, authorship fees, etc), foreign loans and, since 1948, foreign aid. Austria's payments balance could be equalized in recent years only with the help of foreign aid. The international value of the schilling had to be reduced several times.

In comparison to the first postwar years, Austria's dependence on foreign countries has decreased. Nevertheless Austria, as a country dependent on imports, absolutely must increase its exports. Between 20 and 25% of industrial output should be exported if an even trade balance is to be achieved.

8. Transportation

(a) Railroads

The transportation routes are first of all dependent on the terrain features and are traced in advance by nature, particularly in the mountains, in the form of certain valley lines and mountain

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passes. By virtue of its position in Central Europe, Austria is a traffic center containing important international transportation routes from W to E and N to S.

The traffic volume on these lines is influenced by world political conditions; some formerly important routes declined while others took their place.

Figure 13 shows the border stations on the transportation routes leading to foreign countries; Figure 14 shows the direct express connections in Central Europe which run through Austria and their many connecting links; it also shows Austria's importance as a transportation center.

In addition to these express connections, there are other important direct long-distance routes from and to Austria, especially during the height of the travel season; these include such routes as Austria -- Belgium via Passau -- Cologne, Austria -- Holland from Villach via Badgastein -- Salzburg -- Cologne, Vienna -- Buchs -- Basel -- Paris, Feldkirch -- Bregenz -- Lindau -- Strasburg -- Paris, Vienna -- Tarvis -- Genoa and Rome, Vienna -- Graz -- Spielfeld -- Triest and Belgrade. The Tauern Express, which has been running since 1951, is very popular. It takes 2 and 3/4 hours off the London-Belgrade run which normally uses the Simplon Express. Starting in the summer of 1953 2 additional express connections were established on the Tauern line (seasonal runs). The Adria Express comes from the new terminal at Grossenbrode (-- Gedser-Scandinavia) and establishes a fast connection via Hamburg-Munich-Salzburg-Villach with the Yugoslav and Italian Adriatic coast (Rijeka, Split, or Venice-Ancona). The Austrian Express comes from Hoek van Holland and runs via Salzburg-

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Villach-Klagenfurt-Leoben to Graz. It has through cars which come from Ostend and go all the way to Triest or from Amsterdam to Venice. Prior to 1938 the most important N-S link ran from Prague-Linz and does not have any fast through trains; the line Prague-Gmuend-Vienna has fast trains only in the summer. There is no traffic to Czechoslovakia at this time via the local border stations at Fratres, Retz, Laa, and Berg (Pressburg). The rail hub at Lundenburg (Breclav) handles the N and NE traffic from, to, and via Vienna (Warsaw and Prague-Vienna-Triest and Rome; Warsaw-Vienna-Basel with a few through cars).

The W-E rail line which follows the Puster Valley and the Drau Valley from Sillian to Bleiburg is of international importance only on certain stretches.

To facilitate the connection between various border regions, which can be reached via rail over a short distance only by crossing foreign soil, there are so-called "corridor" trains ("privileged" traffic without passports and customs check, no getting off on foreign soil); these run from Lienz via Toblach (S. Candido) -- Franzensfeste (Fortezza) -- Innsbruck, from Klagenfurt via Bleiburg -- Unterdrauburg (Dravograd) to Wolfsberg, and from northern Burgenland to central Burgenland via Oedenburg (Sopron).

Freight through-train traffic through Austria is of economic importance because it is a source of foreign currency; this traffic has to meet stiff competition from other countries; efforts are being made to meet this competition through special rates.

Freight traffic is the main income source of the railroads. In 1937 the ratio between income from freight traffic and passenger traffic was 69:31, in 1952 it was 75:25.

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The total length of the Austrian railroads amounts to over 6,700 km to which we must add 400 km of narrow-gauge track. By the end of 1951 about one-fifth of the trackage had been electrified.

The electrification results in an annual saving of 650,000 t of bituminous coal which would otherwise have to be imported. Since electric traction has many other major advantages, plans are being made for further electrification.

(b) Highways

Highways have attained great importance not only in local but also in long distance transportation due to the rapid strides in motorization, the increase in traffic, and the unprofitability of new railroad construction.

The motor vehicle has become an indispensable means of transportation. The most out-of-the-way little towns and villages are offered fast connection with other means of transportation through highways. Motor vehicles opened up vast new areas for tourist traffic. Due to the rather awkward layout of the railroad network in Burgenland, most passenger and freight traffic takes place on the roads.

The federal government (see note) and the states are taking over the maintenance of an increasing number of highways. ([Note] The government collects taxes to this end, e.g., taxes on mineral oil, transportation, and vehicles, import taxes on motor vehicles, etc). Although no such magnificent highways as the Mt. Glockner High Alpine Road (1935) and the Pack Road (1936) were built after 1945, it must be noted that there are many expansion and repair projects under way

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which are designed to improve the roat net. These are engineering projects which are costly and lengthy but which in the final analysis will strengthen Austria's ability to compete.

Plans have been made for several mountain pass roads, others were completed (Salzach Valley-Gerlos Pass-Gerlos Valley; "Hochtannberg" Road in Vorarlberg: Schroecken-Hochkrumbach -- Warth). After the completion of the power plants in the mountains, former temporary roads leading to construction sites have been widened and improved and made available to tourist traffic (e.g., Montafon-Bieler Heights-Paznaun Valley).

In the summer of 1953 vehicles of the motor vehicle service of the Federal Railroads and of private railroads, of the transportation companies of various cities (not counting city traffic), and mail trucks regularly (once or more times a day) traveled over 30,000 km of the road net. We must not overlook the many excursion trips by travel bureau groups, clubs, and groups of school children which cut into the once completely dominant railroad traffic volume. A considerable part of passenger and freight traffic shifted to the highways where these run parallel to railroads. This constitutes a by no means inconsiderable loss of income for the government. The latter seeks to reduce these losses by putting a considerable burden on users of motor vehicles (e.g., special tax on long-distance freight hauling). Many an unprofitable railroad line will have to be abandoned and give way to highway transportation.

(c) Mountain Railroads

Mountain railroads and all kinds of cable cars open up Austria's scenic landscape sections to tourist trade. (The various mountain railroads and cable cars are fully listed in the railroad schedules.)

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The Mt. Schafberg (1893) and Mt. Schneeberg (1897) cogwheel railroads have been in operation for many decades. In 1926 the Rax line was commissioned as the first passenger cable car of the republic. In the summer of 1953 there were 17 such lines which publicly operated. Austria's engineers and industry built a new type of car line with few cable supports; this makes possible greater speed and greater economy. Austria leads in this type of passenger cable car and has set an example for many similar projects abroad. The effort to increase performance and lower construction costs led to the development of gondola car lines which are in continuous operation; they have many, mostly 4-seater gondolas which can be added or taken out of circulation depending on the need.

In the interest of promoting tourist traffic, particularly during the winter, many mountain and ski lifts (chair lifts, tow lifts) were built in the federal states. In addition to mountain railroads, winter sports centers often have several lifts. Such places are favorite tourist centers (Arlberg, Kitzbuehel, Gastein).

Quite a few of the transportation facilities of the Alpine power plants will continue operating for tourists, such as is the case now with the cable car and elevator of the Ill power plant (Silvretta) and the passenger cable car of the Stubach power plant.

(d) Shipping

The Danube is the grand highway of Austrian shipping.

Prior to 1937 there were 11 shipping companies with more than 240 steamers and over 60 motor ships operating on it. The principal items shipped up the Danube were grain, cereals, eggs, and petroleum; going downstream they consisted of lumber, iron and metal products, stones, bricks, and paper. (The cheapest way to

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ship bulk goods is usually via water. Advantage over rail transportation: for one t of cargo we get much less deadweight when we use large freight vessels; the maintenance of river routes is much cheaper than that of railroads.

The situation changed radically in 1945. Danube traffic will experience an upswing only after an international treaty has been signed. In this connection the fate of the "First Danube Steamship Company" will have to be decided.

Traffic is gradually reviving in the Austrian section of the Danube. One of the occupation powers is running a freight operation on its section of the river, going downstream.

Increasing freight transportation from Linz to Regensburg is being pushed since 1947 by the "First Danube Steamship Company" in close collaboration with the "Continental Motor Ship Company" and with German companies; this involves a division of the cargo quantities. Going upstream are shipments of pig iron, artificial fertilizer, lumber, staple fiber, and recently also petroleum, i.e., goods destined for West Germany and further shipment via western sea ports. Coming from Regensburg, we have shipments of Ruhr coal for VOEST (1952: 1.4 million t), fluorite, ores, soy oil, and grain (1952: roughly 72% of the total freight volume). Passenger traffic was initially confined to the stretch from Linz to Passau. In 1952 it was possible to resume passenger and freight traffic between Linz and Vienna; in 1952 freight traffic amounted to 2.40 million t as against 1.38 million t in 1951. One year later German ships were again loading petroleum for West Germany. A Yugoslav shipping company operates a freight traffic line via Vienna to Regensburg. Its main port is Linz.

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The port of Linz is being expanded continually; it also has a duty-free warehouse area. This will be of special importance when the grand shipping highway Rhine-Main-Danube has been completed. In 1952 the Linz port handled a volume of 1.9 t, in 1950 1.19 million t.

In Vienna (1952 volume: 0.16 million t, 1950: 0.01 million t, 1937: 1.06 million t) large new port facilities were begun during the war; their completion is planned. They will have a special task once East-West traffic has been resumed and after the connection to the Danube-Oder Canal has been completed.

Shipping on the various lakes is only of local importance. This also applies to Austria's shipping on Lake Constance. If the Rhine can be made navigable from Basel to Lake Constance, a new Austrian port is to be built on the lake W of Bregenz.

Logging on the tributaries of the Danube depends on the season and is decreasing constantly; it has been replaced with rail and truck transportation which makes possible year-round and more protective shipment.

(e) Airlines

Until the treaty has been signed, Austria is not allowed to have its own airline. However it is connected with international air traffic by foreign airlines; this brings a considerable stream of tourists (1952: 22,900) to the country (Figure 15).

Although these airlines serve first of all foreign interests, they nevertheless constitute an important link with the rest of the world.

Once Austria is again master of its air space and has its own

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airline, it will still have to confine its operations to domestic traffic. The W-E extent of the country calls for domestic air traffic which can open up new economic possibilities for travel and freight, mail and newspaper service, etc. Austria and other countries of similar size are way ahead in domestic business and tourist traffic using private aircraft (including helicopters), in pest control, in land surveying and terrain planning, in air rescue, etc. The establishment of its own airline will give Austria many new work and job opportunities.

9. Tourist Trade

Points of attraction for tourists are the manifold scenic beauties of the Austrian landscape, the many cities with their cultural and historical treasures, the health resorts and mineral springs, international events such as fairs, university weeks, congresses, musical and artistic events, festivals, sports events of all kinds, and folk festivals.

Tourist trade is important to Austria in a cultural, social, and economic sense.

The foreigner gets to know Austria as a culturally highly developed country. Vacation trips are even today a social necessity for all strata of the population; they are a means from which the working individual derives strength, good cheer, and good health. Last but not least, there is the economic side; in this connection we must distinguish between domestic and foreign tourist trade.

The foreign currency income from tourist trade should contribute considerably to the balancing of the deficit in Austria's trade balance. This can be achieved only gradually. In 1937 there were 20.6 million

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overnight stays by Austrians and foreigners; in 1952 there were only 18.6 million, including [illegible figure: 6.7 or 0.7] million by foreigners. Overnight stays by foreigners in 1952 amounted to 95% and those of Austrians amounted to 87% of 1937.

Statistics can give only an approximate picture, since they consider only the overnight stays in 1,700 communities. We get a different picture when we count the foreigners who crossed the border. In 1952 a total of 4.4 million foreigners entered Austria, including 69.5% by road, 30% via train or ship, and 0.5% via plane. These figures show the importance of the expansion of the Austrian road net in tourist trade.

There has been quite a shift in the list of countries from which foreign tourists came. There are no foreigners from East Europe at all. In 1952 more than 70% of the guests from abroad came from such neighboring states as West Germany, Italy, and Switzerland, 4.5% from the US.

The number of foreigners who visit Austria does not depend only on the economic conditions in their home countries, but primarily on whether Austria is inexpensive to travel in. The guests from Southern, Western, and Northern Europe no longer belong to the wealthy classes; often they take buses in their home country and travel to and in Austria; they just want a place to pitch their tents and bring their traveling habits with them.

In 1952 about 72% of the overnight stays of Austrians were concentrated in Upper and Lower Austria, Styria, and Carinthia; about 75% of the overnight stays of foreigners occurred in Salzburg, Tirol, and Vorarlberg. The flatlands and hills of Upper and Lower

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Austria, the Alpine part of Burgenland, and eastern Styria are strips of land with small summer resorts; visits to these places often are connected with the presence of relatives there.

In 1937 the foreign currency income from tourist trade amounted to about 220 million schillings (1950 value: 80 million dollars), thus covering the unfavorable trade balance. In 1950 foreign currency intake valued at about 400 million schillings (= 14 million dollars) covered one-tenth, and in 1952 (807 million schillings = 28.8 million dollars) about one-fourth of the unfavorable trade balance. Although the actual expenditures of foreign visitors are higher, Austria will have to make every effort in order to adjust the unfavorable trade balance through income from foreign tourists (estimated total turnover for 1952: 2.8 billion schillings).

Austria's Economy -- Review and Outlook

In 1918 the small Austrian Republic was separated from the economically well-balanced Austro-Hungarian Monarchy; the republic gradually built the foundations of its existence during the following years. In 1938 it slipped to the status of a province of the then "German Reich" and its economy was oriented toward Germany's needs. Toward the end of the war the country saw a measure of destruction unparalleled in its history; after the cessation of hostilities, there were extensive "dismantling" activities and dispossessions.

Despite the country's occupation, despite lack of goods and starvation rations, Austria began to rebuild its economy under the greatest difficulties. After a few isolated aid shipments, Europe and other areas hit by war became the recipients of planned aid from abroad; the aim was to make the various countries capable of competing in world trade again, thus avoiding collapse of the world economy. The

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long-range goal was an all-European, supranational economy. The replacement of machinery and the new construction or expansion of plants were to make it possible for these countries to catch up to the rest of the world and to effect maximum employment.

Much has been achieved in the years since 1945, particularly in industry, with whose production upswing domestic agriculture for various reasons could not keep pace. In autumn of 1952 agriculture finally produced 100% of 1937, while industry attained an annual average of 167% (Figure 16). This production increase however could be attained only with the help of an employment figure which reached 160% of 1937, i.e., "productivity," the production quantity of the individual per working hour, despite the rationalization of the enterprises, was only slightly higher than in 1937.

There are various reasons for the low increase in productivity, among others the fact that Austria has many small enterprises which work with old equipment, high costs, and low productivity.

In the summer months of 1951 the statistics for the first time since 1918, showed an employment figure of over 2.04 million individuals. This high figure could not be maintained in 1952. The consumption of consumer goods at home remained within strict limits while exports at times suffered heavy reverses (Figure 17) because other countries were able to sell cheaper than Austria or because some importing countries restricted their purchases.

Since 1945 Austria's population has been consuming more than its overall economy produced. The consumption surplus so far has been covered by aid from abroad. (The value of aid had reached about 13.7 billion schillings by February 1953.) This aid is approaching

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its end. If a somewhat corresponding and "genuine" standard of living is to be maintained, then the currency will have to remain stable, agricultural production will have to increase considerably, more foreigners will have to visit the country, productivity will have to be increased greatly, handicrafts and industrial production will not only have to be increased but will also have to be made more rational and cheaper, and exports will have to be increased greatly. Austria will always have to import much in the way of raw materials and quite a few food items and will thus be dependent on the constantly changing world market prices.

Small countries such as Austria suffer from the fact that their economy has to operate in rather cramped quarters. It is hoped that Austria's economy will experience a healthy growth through its coordination with a uniform European market.

Austria has rich natural resources and an industrious population. The material advances must be joined by the realization that everyone depends on everyone else, that the cooperation of all -- within the country as well within the family of nations -- is necessary. Then the advances of the country will be secure and little Austria will hold an honorable place in the community of nations.

SECTION IV. POPULATION

(Data based on the 1 June 1951 census.)

1. Number and Density

At the time of the 1951 population census Austria had 6,933,900 inhabitants, i.e., about 1.3% of the population of Europe. One quarter (25.5%) of this number lived in Vienna; almost half of the total population lived in Vienna and Lower Austria. The relative population density was 82.7 with Vienna, 62.5 without Vienna.

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Austria's comparatively low population density is due partly to the large area covered by mountains. Of all the neighboring countries only Yugoslavia has a lower population density (64); the major neighboring countries are much more densely settled. West Germany has 194 people per sq km, Italy has 155.

The population density in the various federal states varies according to the terrain and the possibilities it offers (cf. federal states).

Population density in the cities amounted to 1,922 for Linz, 1,780 for Graz, 1,576 for Salzburg, 1,453 for Vienna, 1,119 for Klagenfurt, 934 for Innsbruck, 686 for Bregenz.

About 34% of the population lived in approximately 3,500 communities with less than 2,000 inhabitants each; 16.4% lived in communities with 2,000 to 5,000 inhabitants, and 7% of the total population lived in the 3 large cities of Graz, Linz, and Salzburg.

The concentration of the population has been increasing in the larger settlements since 1934. Although the total population increased by 174,000, there were 200,000 people less in rural communities in 1951. On the other hand, the population figures of the small and medium towns have increased by 218,000. In the large cities they are 136,000 higher than in 1934.

Despite the population increase in the larger communities, more than half of the population still lives in rural communities (up to 5,000 inhabitants), one-third in Vienna and the other large cities, and only one-sixth in small and medium towns (5,001 to 100,000 inhabitants). Thus rural settlement predominates in Austria.

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2. Religious Denominations

An average of 89% of the population are Roman-Catholic, 6% are Evangelical, one percent belong to other denominations, and 4% do not belong to any church.

Most Protestants -- apart from those concentrated in Vienna -- are found in Upper Austria, Styria, Carinthia, and Burgenland. Percentagewise, considering the population of the individual federal states, we get the following order: Burgenland, 14%, Carinthia 10%, Vienna 8%, Upper Austria, Salzburg, and Styria 6% each, the rest 3% each. Of the 11,200 Jews, 9,000 live in Vienna.

3. Language

As for language, 99% of the population registered as German-speaking.

Of the non-German speaking population (Austrians and foreigners) the Croats constitute the largest segment (38%). Of the roughly 34,000 Croat-speaking people, more than 30,000 live in Burgenland. The Slovenes make up 26% of the non-German speaking population; 22,500 of them live in Carinthia. Of the roughly 11,200 Magyars (12%) more than 5,000 live in Burgenland, more than 1,000 each in Upper Austria, Salzburg, and Vienna. The figures on language permit only rather limited conclusions as to nationality.

4. Sex

The 1951 census found that there were rougly 500,000 more women than men. For 100 male inhabitants there were an average of 116 female inhabitants (1910 ratio 100:102, 1934 ratio 100:108). Vienna had the largest surplus of women (100:130).

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5. Citizenship

In 1951, 95% of the population were Austrian citizens.

More than 76,000 were aliens, including 23,000 from Germany, over 14,000 from Yugoslavia, over 9,000 from Italy, over 5,000 from Hungary, and over 4,000 from Czechoslovakia. As a result of the war there were over 246,000 stateless individuals and persons with unknown or unspecified citizenship, although there had been extensive resettlement and naturalization activities, almost 100,000 of this number lived in Upper Austria (10% non-Austrians; Salzburg 8%, Lower Austria and Burgenland 2% each, Vienna 3%). (From 1945 to the end of 1951, 1,011,000 foreigners were repatriated or resettled from Austria. Many refugees who found a new home in Austria have contributed much to the country's upswing, e.g., in industry, agriculture, as specialists and scientists, as university professors, etc.)

6. National Origin

Statistics furnish us with information on the national origin of the population. More than 500,000 or 8% of the citizens were born abroad; about 250,000 of this number live in Vienna. Thus every seventh Viennese was born abroad.

The following figures give us an insight into domestic migration within Austria. Of every 100 citizens, 53 were born in their present place of residence, 27 came from the federal state in which their present home is located, 12 were born in another federal state, and 8 were born abroad. In Carinthia only 43 people out of 100 live in the community in which they were born, in Burgenland 75. Of every 100 Viennese, 66 were born in Vienna, 20 in other federal states, and 14 abroad.

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7. Population Movement

A comparison of population figures of 1934 and 1951 reveals an increase of the total population by a mere 2.6% although Austria took in about half a million refugees. The reason for this is to be found in the war losses and in the declining birth rate. In 1951 Austria had a birth surplus of only 2.1 per 1,000. Apart from a few fluctuations, one can note a constant decline in the birth rate since 1871 (1871: 31.0 per 1,000 live births, 1951: 14.8 per 1,000); there is also a constant decline in the death rate (1871: 31.0 per 1,000, 1951: 12.7 per 1,000).

Vienna had a particularly declining birth rate in the last few decades. Between 1948 and 1950 this decline amounted to an average of 4 per 1,000. In 1951 Vienna had 25,872 deaths; there were 12,550 live births and 26,402 immigrated.

In 1950 there were few countries in Europe with a low birth surplus anywhere near that of Austria, e.g., Luxemburg 3.2 per 1,000, Great Britain 4.4 per 1,000. On the other hand it is 7.8 per 1,000 in France, 8.0 in Switzerland, 9.8 in Italy, 17.1 in Yugoslavia; Iceland has the highest figure with 20.3.

One should note the changes in the population figures of the various federal states and cities between 1934 and 1951 (figures in %, + means increase, — means decrease). State of Salzburg +33.1, Vorarlberg +24.0, Upper Austria +22.8, Tirol +22.4, Carinthia +17.2, Styria +9.3, Lower Austria -3.5, Burgenland -7.8, Vienna -15.4, Linz +60.1, Steyr +45.2, Salzburg +47.5, Klagenfurt +28.2, Innsbruck +20.6.

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8. Economic Structure

The number of employed people -- i.e., those people holding permanent or temporary jobs -- in 1951 represented 48% of the total population; unemployed people -- i.e., those who are no longer working but are drawing pensions or are collecting benefits -- accounted for 11%; house wives and other family members being supported by employed individuals accounted for 40%, others unspecified one %.

EMPLOYMENT BREAKDOWN

	Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unknown
1951	32%	41%	13%	6%	5%	2%	1%
1934	36%	32%	16%	4%	4%	5%	-
1910	39%	32%	14%	-	-	7%	-

The employed people included 61% men and 39% women. Of all employed people, 65% were employees, i.e., workers, white collar employees, and apprentices, including unemployed, 17% were self-employed, and 18% were family members helping in the particular operation.

If we coordinate the figures of nonworking family members with the occupation of their breadwinner, we get the following picture of the "economic subdivision of the population."

Farming Forestry	Industry Trades	Business Transportation	Professional People	Civil Service	Domestic Service	Unemployed	Unknown
22%	37%	12%	5%	4%	1%	15%	4%

The figure on "Unknown" involves mostly displaced persons and refugees.

9. Folklore

The knowledge of the local dress, habits, and customs of the population of Austria contributes much to the understanding of the character of the Austrians.

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The folk dress, such as we can still encounter it in certain regions of Austria, is something that developed through the centuries; much has been discarded, forgotten, or changed in the course of time.

The local styles illustrate the separate entity of the various regions, particularly that of the various Alpine valleys. The dress reveals a certain adjustment to the mountainous character of the region of the occupation of its inhabitants.

This can be seen for instance in the outfits of the lumber jacks or the shepherds. It reveals the toughening of the individual against wind and weather; this style is found from Tirol to the Limestone Mountains of Lower Austria and in the high Alpine valleys. These people wear knee-length leather or Loden cloth pants with suspenders. The torso is protected by a cape, called "Wetterzaug" in the Wechsel Mountains, which consists of one piece of cloth covering the chest and back and having a slit opening for pulling the garment over the head. This is complemented by low-cut shoes, a felt cap, or a small mountaineer hat. In addition we can also see broad-brimmed, old-Alpine style hats with low crowns; it was originally worn by the soldiers of the Thirty Years' War, for which reason the farmers in Styria and in nearby Carinthia call it the "Wallenstein" hat.

Local dress often reveals certain features taken over from city styles.

There are regions in which a certain local style developed uniformly; such regions are called "landscape groups" in folklore.

The Alpine Foreland in Lower and Upper Austria was subjected to the greatest style changes due to the bustling transportation

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activities; for this reason styles changed rapidly to resemble those of the big city. Certain items of apparel, such as the gold caps, appear in various forms representing the regions of Linz, Wachau, Vienna, etc. The social consciousness of the Lower Austrian vintners, which developed in the eighteenth century, was responsible for a certain individual style, e.g., the blue scarf of the working outfit or the checkered jacket and bright kerchief of the women.

In Styria we find the "Alpine" Styrian style consisting of a grey Loden jacket with green lapels and piping, long or short pants, and Ausseer hat; this style also spread to the Traun and Inn regions, the Salzkammergut area, the southern, mountainous part of Lower Austria, and the Lavant, Gurk, and Mettnitz Valleys.

In Salzburg we have a style of women's gala dress dating back to the eighties and consisting of a pleated skirt, tight bodice, bright apron, and flat, black hat with a plate-shaped brim; this style is also found in the lower Inn Valley.

Vorarlberg has very old-fashioned women's styles but men's styles kept up with the times since the men travelled more and picked up more ideas abroad.

An entire style province is represented by East Tirol, upper Carinthia, and German South Tirol. The red jacket of the men, customary in the uppermost Lesach Valley is also found S of Brenner Pass; the brown jacket is worn throughout the Puster Valley; in addition we have the manifold hats with pointed and low crowns.

In the Gail Valley we can note the influence of the Slavic styles with the short skirts and the oddly folded kerchiefs of the women.

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Customs

The natural phenomena during the seasons and the festivals of the church year in many regions of Austria produced certain customs which point up the individual character of the people; they strengthen the patriotic feelings which are the roots of ones love for the home country; their cultivation, preservation, and judicious revival are therefore important tasks; teachers and schools can do much in this respect.

Let us briefly list the most important customs, such as they manifest themselves throughout the year.

January. Blowing of trumpets from towers during New Year's night. "Star singing" before or after Epiphany throughout the entire Alpine region. "Berchtenlaufen" (Perchtenlaufen) and Perchtentanz; these are masked and noisy processions which in the Alpine states are known by such names as "Berchtenjagen," "Perchtllaufen," "Perchtlspringen," "Gloeckln," "Peschtln," "Toellersingen," and "Trestetanz." In the Pongau Valley the "Perchtenlaufen" is moved up to carnival time. At that time the "beautiful Perchten" masks wear the "Perchten cap" on the head; this is a high, richly decorated contraption, called "Tafelpercht"; the members of the procession march ~~quietly~~ and in a solemn fashion and dance the "Perchtentanz" on the squares, while the "ugly Perchten" masks accompanying them make noise and engage in all kinds of pranks.

February. Whip cracking, called "Aperschnalzen" in Salzburg, "Korn aufwecken" [awaken the corn], in Tirol. Carnival procession in various form occur throughout the entire Alpine region. The masquerades at carnival time date back to the noisy routing of hostile frost and weather gremlins. "Blochziehen" and "Pflugziehen" [plow pulling]

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originally were fertility rites and magic healing ceremonies; they are particularly popular in Styria and Burgenland. The "carnival burial," a symbolic burial of the winter, has been preserved in many places in the Alps. The "winter and summer game" is a popular spring festival event.

March, April (Easter). The introduction to the many and varied Easter customs is represented by the "palm dedications" and the procession with the "Palm," the palm bushes, which take the most varied forms from a small bouquet made of branches of the Sal willow, juniper, milkwort, yew tree, etc to the tall, artfully garlanded "Palm," which must be carried by several lads. Processions of the "rattle boys" from Maundy Thursday to Saturday. Eating of gree vegetables on Maundy Thursday. Resurrection, particularly magnificent in Tirol. Easter bonfires, Easter shooting, e.g., in Styria. Egg rolling. Field processions (Easter Monday). Easter riding on Easter Tuesday (Salzburg). "Vierberg" pilgrimage in Carinthia on the second Friday after Easter, a 24-hour pilgrimage over 4 mountains, starting from Magdalen Hill. "Grasauslaeuten" on St. George's Day (24 April) in the Schwaz region (Tirol), a sort of belated "Gloeckln."

May. "May Pole" setting, entire Alpine region and Lower Austria. Race to the pole, pole climbing. "May Pole auction" on the last day in May on the Schneeberg and Semmering region. Whitsuntide customs: on Whitsun Saturday, Pfingstschnalzen and Whitsun shooting, Whitsun fire, "Pfingstluken," customs spoofing the late risers on Whitsun Sunday. One of the nicest Whitsun time games is "Kufenstechen" in Feistritz in the Gail Valley; this is a game for horsemen who must spear a barrel or a loop with a lance as they charge past. Corpus Christi processions, sometimes on horseback, on boats on the lakes of the Salzkammergut area. May pilgrimages.

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June. Solstice fire, evening of 23 June.

Summer months. Wrestling games in Tirol, Carinthia, Salzburg. Samson procession in Krakaudorf near Murau on the Sunday following 5 August, St. Oswald Day; in Tamsweg on Corpus Christi Day. In this procession, "Samson," an 8 m tall figure in fancy costume, is carried around. This may represent the old custom of "carrying death out."

September. During this month most of the "kermis" days are held; Aegydi fair in Graz, annual fair in Aussee, the famous meadow fair in St. Veit on the banks of the Glan on Michaeli Day, the Salzburg "Dult" fair. The "drive from the pastures" mostly takes place on Michaeli Day (29 September); the animals are decorated with bouquets and wreaths, as is the "Protzwagen" carriage which, loaded with pasture equipment and butter and cheese, forms the tail end of the procession. In Tirol herders and dairy people, called "Brenntler," celebrate the so-called "Schopp Week" during the last 8 days of the pasturing period; this is an occasion for frolicking.

October. Certain customs are connected with the end of the threshing period: threshers' banquet, dance, called "Drischleg" in Salzburg, and various "Drischleg" games. In wine region the end of the harvest season is usually celebrated with vintner feasts, where in some regions we find the "Weinbeergeiss" or "Weinbeerbock," a wooden scaffold with a goat's head and decorated with grapes; these are traces of the old sacrificial processions.

November. All Souls customs. In flax-growing regions we find certain "Brechel" customs connected with the processing of the flax; here we have the "Brechel fright" and the so-called "Brechel sermon" customs full of peasant witticisms.

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December. Halloween customs. Advent customs: processions ("Herbergsuchen"; "Frauen- und Josefitragen," at which time pictures of wax figures are carried from house to house), Advent trumpet blowing. Customs during the 12 "hoarfrost nights" from St. Thomas Day (21 December) to Epiphany ("smoking out" of rooms of the house, "Loessel" games: fortune telling, etc). Blowing of trumpets from towers on Christmas Eve, midnight masses, setting up of cribs, singing, Nativity figurines.

FIGURE CAPTIONS

Figure 1. Tectonic diagram of the East Alps by professor doctor L. Kober, 1949. [Within figure, from left to right] Molasse; Flysch Limestone Zone; Graywacke Zone Central; Zone; Karawanken Range; Carnic Alps; Southern Alps; Limestone; Molasse; Alpides; Dinarides; Flysch zone; Foreland; Helvetian; transition Pennine East Alpine; Dinaric-South Alpine Foreland; Magma zone; Anatexis zone; Magma zone (drawn by Walter Medwenitsch, January 1949).

The rigid Foreland masses in the N and S push against each other, as is shown by the arrows. Between them the mountain-forming plastic zone, the Orogenic, is pressed out and flows over the Foreland. In this connection the movement of the surface cover structure goes mostly toward N (the actual Alps, Alpides); only the southern parts (Dinarides) show a southward movement. In the depth of the orogenic trough we find the anatexis structure. Various zones (G_1- G_5) can be noted here. The upper part is granitic, the lower more basaltic. From the upper zones issue the granitic intrusions (Adamello, Rieserfern) and, as last volcanic phenomena, the young ore veins of the Taueren Mountains (gold deposits). In the southern Foreland, basaltic magma of the Atlantic type (e.g., in the Euganean Alps) rises from the magma zone. In the tectonic superstructure K designates generally

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old crystalline bed rock which in the depths is frequently assimilated. The Pennine bed rock (Hohe Tauern Mountains) adjoining the Helvetian zone to the S is broken up into several covers which are enveloped by slate covers (mostly metamorphic Mesozoic). Above the slate cover comes the East Alpine cover mass which was superposed by the Pennine system from the S. It consists of an old crystalline nucleus (K), subdivided into several covers, from the Paleozoic and Mesozoic. The lower East Alpine rock series lying on top of the slate cover in the Radstadt zone (R), in keeping with their tectonic location, consist mostly of upside-down Mesozoic; the latter is superposed by Paleozoic, which in turn is superposed by crystalline. The middle and upper covers of the East Alpine cover mass were the source of the Mesozoic of the northern Limestone Alps (K_1-K_4) which overfaulted the Flysch (F_1-F_2); then comes the Paleozoic of the upper and lower graywacke zone (O, U), the East Alpine old crystalline of the Central Zone, which bears upper East Alpine bosses of Paleozoic (Graz, Murau, Gurk Valley) and Mesozoic (K_5; e.g., in Stangalpe). The Central Zone, which warps up high in the W, gets lower going eastward; it has an axial gradient. The upper parts of the East Alpine cover system are therefore only preserved in the E, while in the western Central Zone, due to the stronger upwarping, the East Alpine cover mass is more eroded, so that in many places only lower East Alpine rock series are preserved (Radstadt Tauern Mountains) or even that all rocks of the East Alpine cover are absent; as a result of this, the Pennine rock masses, superposed by these covers, came to the surface (Tauern windows, Engadin windows). In the S of the Central Zone the crystalline of the Drau Alps system bears Paleozoic (e.g., Zoll Plain to Posruck) and on top of that Mesozoic of the Drau Limestone Alps = K_6 (Lienz Dolomites -- Karawanken Range). A crystalline zone = K (Gail Valley -- Eisenkappel)

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forms the border against the Dinaric system. The latter begins with the Paleozoic (P) of the Carnic Alps; to the S follows the Mesozoic of the southern Limestone Alps K_7-K_8 (Steiner Alps, Julian Alps, Dolomites).

For a better understanding of this diagram of the East Alps, which is intended to show the relative position of the various tectonic units contributing to the formation of the Alps, one might add the following. If we cross the East Alps from N to S (N to S [in the diagram]) we move from the Molasse (Mo_1, Mo_2) via the Flysch zone (F_1, F_2) into the northern Limestone Alps (K_1-K_4) and on via the graywacke zone (O, U) into the Central Alps. Here, depending on whether the crossing took place in the E or W, one can find a great variety of rock series. Since the axis of the Central Zone dips toward the E, we still find the upper East Alpine rock series in the eastern part, while deeper tectonic units come to the surface in the W due to the strong upthrust and the attendant erosion of the upper cover layers. If we for instance cross the Central Alps along a line from Mt. Dachstein to Lienz, we are therefore moving on rocks which perhaps belong to that tectonic level which corresponds to the "zero line" in the tectonic diagram; the rocks of the higher levels are eroded in this zone. In such a crossing we thus hit a series of rocks of the same geologic units as they are cut by the "zero line" in the diagram: if we start from the S side of the Mt. Dachstein Range (K_4), we cross first the rocks of the graywacke zone (O, U) of the Enns Valley, then the crystalline (K) of the Schladming Tauern Mountains, and finally, in the area of the Radstadt Tauern Pass, arrive in the lower East Alpine Radstadt zone (R), where one can see mountains which, over upside-down and on Mesozoic superposed Paleozoic (quartz

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phyllite), carry bosses of Schladming crystalline (Mt. Seekarspitz). As we reach the Tauern window in the area of the uppermost Mur Valley, we suddenly find on the surface Pennine rocks which at this point form the Hohe Tauern Mountains with slate cover (S) and central gneiss (K). After crossing the southern edge of the Tauern window (R) in the vicinity of Obervellach in the Moell Valley, we once again step on East Alpine crystalline (K) of the Mt. Polinik-Kreuzeck group which extends into the Drau Valley. S of the Drau we now find the Drau Limestone Alps (K_g) with the Lienz Dolomites. We cross these mountains, traverse a narrow zone of crystalline rock (K) in the Gail Valley, and finally reach the Paleozoic rock of the Carnic Alps (P). From doctor A. Nikl, Die Entwicklung der Erde und des Lebens [The Development of the Earth and of Life], 1950, Vienna, page 72, Deuticke Publishers, Hoelder-Pichler-Tempsky.

Figure 2. Sketch of the structure of the Stubai Alps. Identify rivers and valleys, settlements, elevations, passes. Elevation of Jaufen Pass (here 2,130 m) is 2.094 m on the official map of the Republic of Austria, scale 1:500,000; 1952.

Figure 3. Sketch of the structure of the middle Hohe Tauern Mountains. Identify rivers, mountain groups, settlements, and passes. Elevation figures of the official map of the Republic of Austria, scale 1:500,000, 1952; instead of 2,665 m read 2,663 m; instead of 2,775 m read 2,575 m; instead of 2,463 m, 2,460 m; instead of 3,263, m, 3,246 m; instead of 3,355 m, 3,360 m.

Figure 4. The Strudengau section near Grein; scale 1:75,000; see Photo 66.

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Figure 5. Farm house and compound farms in Austria and its border regions; 18, 18a, 18b are farms in the Bavarian-Swabian Alpine Foreland; according to R. Heckl (partly revised); Alpenrand = fringe of the Alps.

Figure 6. The Austrian customs exclaves. The communities of Mittelberg (97 sq km, 2,830 inhabitants) and Jungholz are part of the German customs area due to their location. Sch = Schroecken, W = Warth, 1 = Kleines Walser Valley, 2 = Starzeljoch, 1,871 m, 3 = Hochalp Pass approximately 1,870 m, 4 = Widerstein, 2,536 m, 5 = Hochkrumbach Pass approximately 1,670 m, 6 = Gentschel Pass, 1,977 m.

Figure 7. The most important valleys in the Arlberg region. Identify river, settlements, elevations, and passes. Elevation figures of the official 1:500,000 (1952) map of the Republic of Austria: 1,303 m should read 1,287 m; 3,041 m should read 3,038 m; 3,318 m should read 3,312 m; 1,802 m should read 1,800 m.

Figure 8. Elevation diagram of the Tauern power plant group at Glockner-Kaprun. According to J. Goetz, Das Tauernkraftwerk Glockner-Kaprum [The Glockner-Kaprun Tauern Power Plant], January 1950, Zell am See. The storage capacity targets have been increased in the meantime. The Margaritze storage basin was increased to 2,000 m (vol = 3 million cu m), Moserboden basin to 2,035 m (vol = 84 million cu m), Wasserfallboden basin to 1,672 m (vol = 86 million cu m). The drop from the Moserboden basin to the Kaprun power house is 1,254 m.

[Within figure, from left to right] Leiterbach collecting basin; Kaefertal collecting basin; Moell pump plant; Moserboden dams; Water locks; Pressure shaft, diam. 2.60, 520 m long; Limberg dam, upper step power house; Zeferat collecting basin; Maiskogel water locks,

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diagonal tunnel, diam. 3.00, 600 m long, slider chamber; 4-pressure pipes, diam. 1.25-1.15 m, 1,200 m long; power house of main step; Margaritze storage area, volume = one mill cu m; Moell transfer tunnel diam. 2.60 m, speed = 17 cu m/sec, 11.6 km long; Moell transfer pipe line; Pressure tunnel, diam 3.20, 4.48 km long, Wasserfallboden storage basin, volume = 80 mill cu m; Pressure tunnel, diam 3.20 m, speed = 32 cu m/sec, 7.1 km long; upper step; main step; Kaprun River; pipe axis; elevation above sea level. Annual power production (in round figures) after completion in million kwh: Main step = summer, 92; winter, 368; year, 460; Upper step = summer, 58; winter, 82; year, 140; Total group = summer, 150; winter, 450; year, 600. Through pumping, 25% summer, 75% winter, 100% year. Potential peak output, maximum plus 200. J = volume; ∅ = diameter; Q = water volume per second.

Figure 9. Location of the city of Salzburg. Define map entries. Elevation figure of the official 1:500,000 (1952) map of the Republic of Austria; 562 m should read 573 m, 2,428 m should read 2,431 m.

Legend: power plant in operation, power plant under construction, power plant in planning stage. [Figure 10].

Figure 10. The power plant series along the Upper Austrian section of the Enns River, as of 1950. Elevation difference between Altenmarkt and Danube: 170 m. New power plant also under construction at Hieflau. (From a sketch in Das Grosskraftwerk Grossraming [The Grossraming Giant Power Plant,].)

Figure 11. From G. Goetzinger, H. Kuepper (1952), and F. X. Schaffer. [From left to right] Sandstone marl, Young Tertiary gravel, Limestone cliffs, Ice age gravel, Loess, loam, Alluvial gravel and sand (Sediments of the Tertiary.

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The soil structure and the terrace in the municipal area of Vienna. The figures show the elevations of the terraces above the level of the Danube. The 2 uppermost are beach terraces of the Pannonian Lake (Nussberg and Burgstall terraces), the other are alluvial terraces of the Danube: Mt. Laaerberg terrace (250-260 m above sea level, Upper Pliocene (?), Arsenal terrace (200-210 m above sea level, youngest Pliocene), city terrace (about 170 m above sea level, Diluvial), Prater terrace (about 160 m above sea level, Alluvial). According to F. X. Schaffer.

Figure 12. The decrease in precipitation (in mm) in the area of the old 21 districts of Vienna. K = Mt. Kahlenberg, HW = Hohe Warte, Central Meteorological Institute, Gredf. = Grossenzersdorf.

Figure 13. The domestic Austrian transportation network with direct through-train connections abroad (Summer 1953). The nearest important transportation hubs are shown. ═ lines with more than one train pair per day; — one train pair daily.

Figure 14. Austria in the Central European transportation network (Summer 1953).

Figure 15. Austria in the international airways system, as of May 1953 (this is a schematic presentation, not an illustration of actual air routes). AF, Air France; BEA, British European Airways; CSA, Czechoslovak Airlines; KLM, Royal Netherlands Airlines; PAA, Pan American World Airways; SABENA, Belgian Airlines; SAS, Scandinavian Airlines System; SR, Swissair (Switzerland); YAT, Yugoslav Airlines.

Figure 16. Means of production, Total production, Consumer goods. Industrial production from 1948 to 1952. The lines show the decline

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in production expansion in 1952 and the relatively low increase in consumer goods production (1937 = 100). From the Institute of Economic Research.

Figure 17. Austria's exports starting in 1950 on the basis of the quantity index (1937 = 100). One can get the proper comparison to the 1937 export value if we eliminate the price changes by substituting 1937 prices for the various goods. The graph shows the strong monthly fluctuations and the gradual increase in the annual average (1950: 101, 1951: 110, 1952: 109). Index figures for June 1953: 138, July 146, August 159, September 160.

Figure 18. Men, Women, in 1,000 individuals. Age structure of the population in 1910, 1934, and 1951 in 5-year groups. This shows the following. The normal age distribution in 1910 (balanced pyramid). The considerably smaller base in 1934 and 1951. The losses in the age groups hit by the war. The particular preponderance of the older age groups in the 1951 census, which is greater than in, 1934. The life expectancy of the population increased (progress in the fields of medicine and hygiene). The balance in the ratio between men and women up to the age of 25 in 1951. The large surplus of women thereafter, particularly between 25 and 34 years. Many problems grow out of the continuing shrinkage of the base of the age structure. In 1953, 40 out of 100 people with social security were no longer working. Data from Oesterreichs Bevoelkerung in Bild and Zahl [Austria's Population in Pictures and Statistics].

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